Seeley Lake

Refuse District

COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN

FINAL REPORT — DECEMBER, 1981

Robert Peccia & Associates

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December 28, 1981

Seeley Lake Refuse District
Seeley Lake, Montana 59868

Re: Solid Waste Management Plan

District Members:

In accordance with our engineering agreement, we are transmitting twenty-five (25) copies of the final Solid Waste Management Plan for the Seeley Lake Refuse District.

This study was funded through a grant from the State of Montana, Department of Health and Environmental Sciences. The primary purpose of this study was to inventory the current solid waste management practices in the study area and to make recommendations as to the most efficient and practical waste management strategy for the area. A summary of the findings and conclusions of the study is included in Part One of this report. The details of the recommended plan for the District are included in Part Six.

We appreciate the opportunity to conduct this study for your Refuse District and feel this project would not have been a success without the assistance of the members of the District who organized and have overseen this project. If you desire additional information, or if we can be of further assistance to the District in implementing this plan, please contact us at your earliest convenience.

Respectfully submitted,

ROBERT PECCIA & ASSOCIATES

Barry E. Damschen, P.E.
Vice-President

BD/gp

SOLID WASTE MANAGEMENT PLAN

FOR

SEELEY LAKE REFUSE DISTRICT

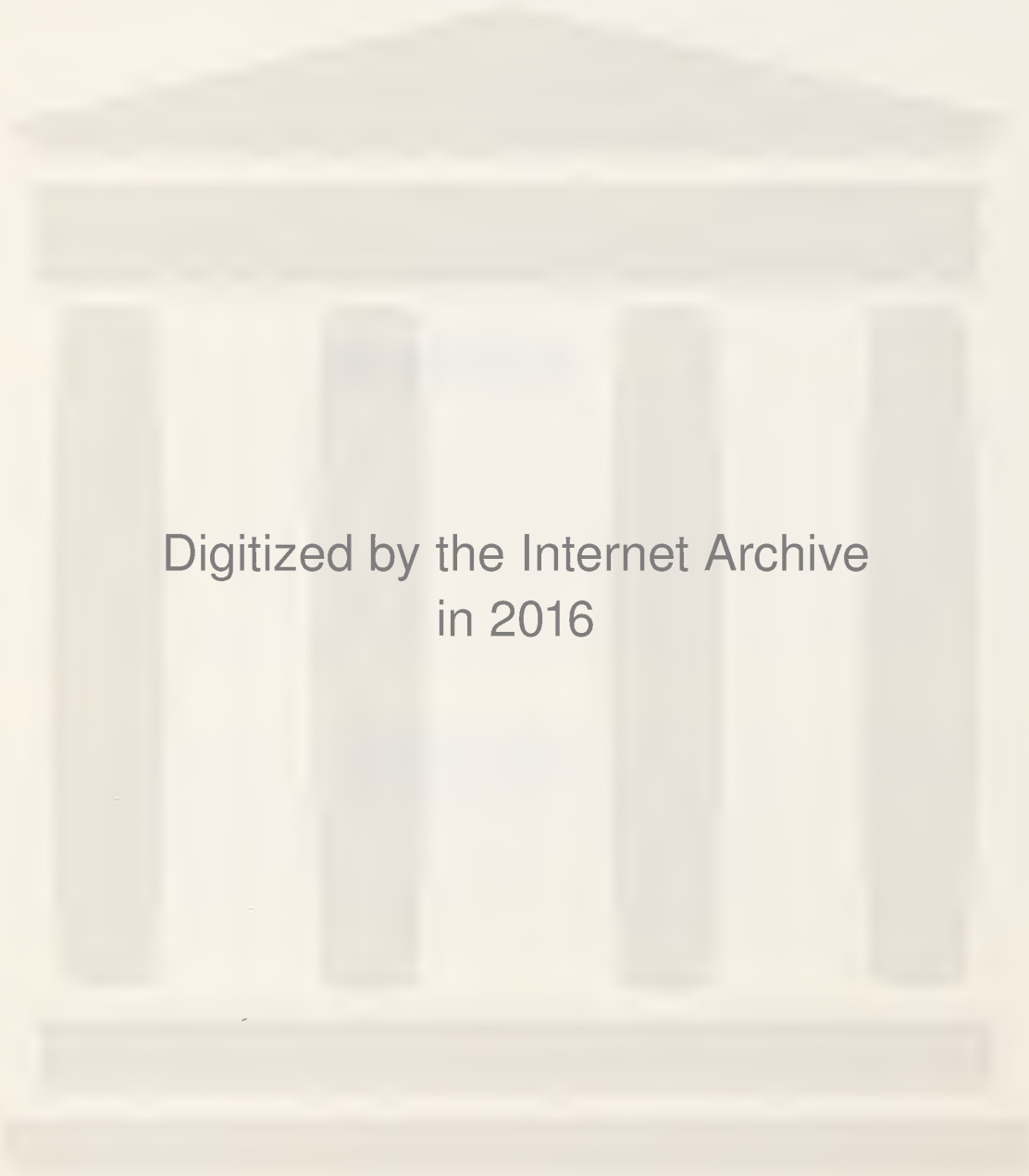
DECEMBER, 1981

FINAL REPORT

Prepared By:

Robert Peccia & Associates

The funding of this project was made possible through a grant obtained from the State of Montana Department of Health and Environmental Sciences.



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PART ONE

INTRODUCTION & SUMMARY

A. BACKGROUND

Growth within the Seeley Lake area over the last decade, the increasing popularity of the region for year-round recreational activities, and the ever-increasing costs of handling and disposing of solid waste in an environmentally safe manner have all contributed to the need for an economical, long-term alternative for solid waste handling and disposal. Currently, no landfill is located in the Seeley Lake area and refuse must be transported substantial distances to be disposed of properly.

Efforts to eliminate solid waste handling and disposal problems began in 1974 when the Seeley Lake Disposal District was created by the Missoula County Commissioners. In recent years, the organization of the Refuse District has been altered somewhat and the need for alternate waste disposal methods has become more acute.

The Seeley Lake Refuse District Board began initial efforts to develop a comprehensive solid waste management plan in the spring of 1980 when the Board applied for grant monies through the Solid Waste Management Bureau of the Montana Department of Health and Environmental Sciences. The application was reviewed and approved by the State, and in August, 1980 the Seeley Lake Refuse District Board retained the consulting firm of Robert Peccia and Associates to evaluate possible alternatives to the current methods of solid waste handling and disposal.

B. PROJECT SCOPE OF WORK

Initially a detailed scope of work was developed by the Seeley Lake Refuse Board and the consultant. The work elements determined applicable were developed such that recommendations could be formulated in an orderly sequence for the proper disposal of solid waste. Included herein is a summary of the work elements that were considered for this project.

1. Identification and evaluation of current solid waste management conditions in the Seeley Lake Refuse District, including solid waste collection and disposal operations and facilities and waste generation and composition characteristics.

2. Development and evaluation of alternate solid waste handling and disposal systems with emphasis on the specific needs of the study area.

3. Evaluation of the feasibility of recycling all or portions of the secondary materials generated within the study area.

4. Evaluation of the current problems and possible alternate solutions for "special" type wastes, including tires, demolition debris, dead animals, used oils, septic tank pumpings, junk vehicles, and other bulky materials.

5. Preparation of a report that summarizes all findings, conclusions and recommendations of the project.

6. Development of a public participation and involvement program for effectively informing the Refuse District Board members and the public of the findings of the project and for obtaining comment and public input.

C. PROJECT SUMMARY AND RECOMMENDATIONS

Included in the following paragraphs is a summary of the findings, conclusions, and recommendations of the project.

1. Demographic & Waste Generation Conditions

It is estimated that currently approximately 1,600 permanent residents live within the Seeley Lake Refuse District boundary. It is also projected that this population is increasing at the rate of approximately 100 residents per year, which indicates that the study area population will more than double by the year 2000. In regard to solid waste generation, it is estimated that approximately 883 tons of waste are generated annually within the District, with approximately 80 percent of the waste generated by permanent residents and commercial interests and the remaining 20 percent by seasonal activities, primarily summer cabin residents and national and state-owned recreational areas.

2. Existing Solid Waste Management Conditions

Currently there is no available public disposal site within the Refuse District. Approximately one-half of the wastes generated in the area are now collected and disposed of by privately owned refuse disposal services at the landfill located in Missoula. The majority of the remaining wastes generated in the area are either transported by individuals to disposal sites located outside the District, burned in "burning barrels", stoves, or fireplaces, or indiscriminately dumped in ravines, etc.

3. Alternate Disposal Systems Analysis

It was determined that three disposal concepts warranted an in-depth analysis for the Seeley Lake Refuse District. These concepts include:

a) the use of a new sanitary landfill to be located as close as possible to the community of Seeley Lake;

b) the use of a transfer system whereby the waste generated in the District would be placed in either containers or transfer trailers at a site located near Seeley Lake, and transported to Missoula by specially designed vehicles for final disposal; and

c) the use of a modular incineration facility where the District's wastes would be burned, with the resultant energy obtained from this process utilized to generate steam or electricity for use locally.

4. Recommended Plan

The evaluations and subsequent recommendations made by the Refuse District Board members indicated that if a new landfill site could be located within a five-mile radius of the community of Seeley Lake, this alternative should be utilized. However, if a suitable site cannot be located, the District should consider utilizing a transfer system. Based on these recommendations, a preliminary landfill location study was undertaken through the cooperative efforts of several local, county and state officials and the Consultant. Through this effort eight possible landfill sites were identified and evaluated according to specific siting, operating and economic criteria. The resultant conclusions from the location analysis indicated that none of the eight sites investigated meet State hydrogeologic criteria without utilizing some type of polymeric or bentonite liner, due to the porous soil types and high groundwater in the area. Because of the extremely high cost of such a liner, coupled with the fact that landowners in the area over the past several years have been reluctant to grant, lease or sell parcels of land for locating a landfill, the Refuse Board is currently re-evaluating all disposal alternatives that have been addressed in this study. It is anticipated that the Refuse Board members, county officials and county health officers will be making a formal decision as to the recommended disposal alternative in the near future.

5. Recycling Feasibility Analysis

It was determined that current market conditions and costs do not favor the implementation of a District-wide recycling program for the secondary materials found in the solid waste stream at this time. Markets do exist, however, for individuals to recover and sell aluminum and glass beverage containers. The nearest markets for these materials are located in Missoula and Kalispell.

PART TWO

EXISTING SOLID WASTE MANAGEMENT CONDITIONS

PART TWO

EXISTING SOLID WASTE MANAGEMENT CONDITIONS

A. GENERAL

When evaluating the existing solid waste management situation in a specific area, there are three major aspects that must be addressed: (1) the current laws and regulations which govern the various phases of solid waste management; (2) the effectiveness of existing solid waste storage, collection and transportation services and the adequacy of the existing disposal facilities; and (3) the quantities and characteristics of the solid waste generated. Included in the following narrative is a brief summary of these major aspects as they relate to this project.

Obviously, there are several other aspects that are directly related to the total solid waste management system in the area. These include: (1) the recovery and recycling of solid waste; (2) the disposal of special and hazardous type wastes; and (3) the economic, organizational and financial aspects of the existing and proposed programs and systems. In the interests of greater clarity and better organization of this report, these aspects will be discussed in subsequent chapters.

B. APPLICABLE LAWS AND REGULATIONS

There are basically three degrees of laws and regulations which directly affect the management of solid waste in the study area. These include: (1) local ordinances; (2) State of Montana disposal laws and rules; and (3) Federal laws and regulations. Included in the following text is a brief discussion of the various laws and regulations which directly affect the management of solid waste in the Seeley Lake Refuse District.

1. Local Ordinances

Currently there are no laws, regulations or ordinances that have been developed on the local level to administer or regulate the disposal of solid wastes in the Seeley Lake Refuse District. The local officials, therefore, primarily regulate the collection, storage and disposal of solid wastes in the area through the use of the applicable state and federal regulations. Summarized herein are these regulations.

2. State of Montana Laws and Regulations

The laws and rules set forth by the State of Montana Department of Health and Environmental Sciences are the principal regulations in the study area which must be adhered to. The

state laws concerning solid waste management were initially adopted by the 1965 State Legislature. Since that time the regulations have been amended three times. The laws and regulations set forth by the State of Montana include legal and administrative control over all phases of solid waste management including the following: (1) facility licensing; (2) standards for the operation and maintenance of facilities; (3) facility classification; (4) solid waste transportation and disposal of hazardous wastes; (5) litter control; (6) disposal of dead animals; (7) feeding garbage to animals; (8) nuisances; and (9) disposal of junk vehicles.

Included in the following narrative is a brief summary of the principal rules and regulations which are included in the State Solid Waste Management Act as amended in 1977. A copy of the complete rules and regulations can be obtained from the State Department of Health and Environmental Sciences, Solid Waste Management Bureau.

(a) Disposal Site Licenses

Under the present state laws, all sanitary landfill sites must be licensed by the State Department of Health and Environmental Sciences, Solid Waste Management Bureau. The Department has established three classifications for refuse disposal sites. A summary of the three classifications is included below:

(1) Class I

Class I sites may accept all groups of waste including hazardous wastes. Class I sites shall not discharge these materials or their by-products to ground or surface waters. These sites must either confine the wastes to the disposal site with no likelihood that the wastes will escape, or they must be situated in a location where the leachate from the wastes can only percolate into underlying formations which have no hydraulic continuity with usable waters.

(2) Class II

Class II sites are suitable for accepting decomposable and organic materials, wood and demolition materials, and digested wastewater sludges. The site must provide for separation of these type materials from underlying or adjacent usable water. The distance of the required separation is established on a case-by-case basis, considering factors such as terrain, type of underlying soil formation, and natural quality of the groundwater.

(3) Class III

Class III sites are suitable for accepting only inert type materials, excluding

potentially hazardous wastes. The site may contain water such as in marshy areas which contain exposed groundwater, or areas which may be periodically flooded, such as along stream floodplains. Class III sites shall not be located on the banks or in a live or ephemeral stream.

The Department may issue a conditional license for solid waste management systems already in existence or under construction on the effective date of this rule. Such a license, if granted, will be valid for up to one year. Only when the Department determines that the conditional licensee has shown good cause for an extension will one be granted. Conditional licenses are to be granted only if the applicant demonstrates that steps are being taken to bring the site into compliance. The local health officer must validate all conditional licenses before they are effective.

The Department may deny or revoke a license to operate a solid waste management system after giving the applicant and the local health officer written notice and an opportunity for a hearing before the Board. The decision to deny or revoke a license may be made only after finding that a solid waste management system cannot be operated or is not being operated in compliance with the state laws and regulations. The hearing held before the Board on a denial or revocation shall be held pursuant to the provisions of the Montana Administrative Procedures Act.

(b) Disposal Site Operation and Maintenance Requirements

(1) Class I Sites

Due to the hazardous nature of the waste that may be processed at these sites, strict supervision is required when such sites are open. Sites shall be fenced to prevent unauthorized access. All Class I sites using landfilling methods shall cover Group I wastes with a minimum of twelve (12) inches of suitable earth cover material after each operating day and at least four (4) feet of earth cover material within one week after the final deposit of solid waste. These steps must be taken unless the Department is satisfied that the licensee has shown good cause for not covering.

Where other solid waste management methods are proposed to dispose of Group I wastes, the operation and maintenance plan must demonstrate to the Department's satisfaction that such disposal methods pose no danger to man and the environment. Group II wastes disposed of at Class I sites shall satisfy all Class II disposal requirements.

(2) Class II Sites

All Class II sites using landfilling methods shall compact and cover solid waste with a layer of at least six (6) inches of approved earth cover material at the end of each operating day and at least two (2) feet of approved earth cover material within one week after the final deposit of solid waste at any portion of the site. These steps must be taken unless the Department is satisfied that the licensee has shown good cause for not covering.

EPA's 1972 publication, *Sanitary Landfill Design and Operation*, (No. SW-65ts) shall be used as the general landfill design and operation manual for purposes of this rule. The Department may develop or adopt guidelines for other solid waste disposal methods and procedures. Semi-solids should be mixed with other solid waste to prevent localized leaching; or separate, specialized disposal areas should be developed. Sites shall be fenced to prevent unauthorized access and shall be supervised when open.

Where refuse containers are utilized as part of a management system for Group II solid wastes, all containers shall be maintained and kept in a sanitary manner and emptied at least once a week, unless other arrangements are determined acceptable.

(3) Class III Sites

Although these sites are not required to be covered by earth materials daily, they shall be covered periodically.

(4) Open Burning

For all classes of sites, the open burning of wastes is prohibited unless a variance has been obtained from the Department.

(5) Litter Control

Dumping must be confined to the areas within the disposal site that can be effectively maintained. In addition, effective means shall be taken to control litter at all facilities.

(c) Hazardous Waste Management Systems

(1) The Department may require the maintenance of records, including copies of

waste manifests, and the submission of reports from persons who store, treat, or dispose of hazardous wastes. Permanent records must be maintained by the operator of a hazardous waste disposal facility, identifying the location of each disposal area and the waste or waste types disposed of. Such disposal records shall be made available to the new facility owner or operator if the facility is sold or leased to another person.

(2) No hazardous waste management system may store, treat, or dispose of hazardous wastes in a manner which is inconsistent with methods approved by the Department.

(3) All hazardous waste management systems are required to have licenses issued by the Department.

(4) Hazardous wastes found in household refuse may not be disposed of at Class II disposal sites without written authorization from the Department.

(5) For areas not served by licensed Class I disposal sites, the Department may, upon showing of good cause, authorize the disposal of hazardous wastes at Class II disposal sites if no health hazard or no danger to the environment would be presented.

(d) Inspection and Enforcement

The Department has the authority to conduct inspections of solid waste management systems at reasonable hours upon presentation of appropriate credentials. If, after an inspection, the Department determines that violation of the act or this rule is occuring, it shall notify the licensee of the nature of the violation. Depending upon the severity of the violation(s), the Department may seek a compliance schedule from the applicant or may initiate proceedings to revoke the license. The Department may also, through the Attorney General or appropriate county attorney, seek to enjoin the licensee or collect a criminal penalty.

(e) Loans and Grants

(1) The Department shall provide financial assistance to local governments for front-end planning activities for a proposed solid waste management system which is compatible with the state plan whenever such financial assistance is available.

(2) The Department shall provide front-end organizational loans for the implementation of an approved solid waste management system whenever funds for such loans are available.

(f) Refuse Disposal Districts

The state laws give the county commissioners the authority to create solid waste districts for the purpose of collection and/or disposal of refuse. Cities and towns may be included in the district if approved by the city or town councils.

(g) Dead Animals

It is unlawful to place all or part of a dead animal in a lake, river, creek, pond, reservoir, road, street, alley, lot, or field. In addition, it is unlawful to place a dead animal within one mile of the residence of any person unless the dead animal is burned or buried at least two feet underground.

If a person refuses or neglects to comply with a written order of a state or local health officer within a reasonable time specified in the order, the state or local health officer may cause the order to be complied with and may initiate an action to recover any expenses incurred from the person who refused or neglected to comply with the order. The action to recover expenses shall be brought in the name of the city or county. A person who does not comply with rules adopted by the Board will be guilty of a misdemeanor.

(h) On-Site Disposal

The state solid waste laws do not prohibit individuals or industry from disposing of solid wastes on his or her own property as long as such disposal does not create a nuisance or health hazard. A nuisance is defined as "anything which is injurious to health or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, or unlawfully obstructs the free passage or use, in the customary manner, of any navigable lake, or river, bay, stream, canal, or basin, or any public park, square, street, or highway."

(i) Motor Vehicle Wrecking Facility Act

Under this act, each county is to establish a county motor vehicle graveyard where any citizen may place a junk vehicle free of charge. The county is also responsible for establishing a collection program in order to pick up the junk vehicles and place them in the graveyard facility. Other provisions of the law call for licensing and shielding all private motor vehicle wrecking facilities and county motor vehicle graveyards.

(j) Penalty for Violations

(1) Any person violating the Act or regulations prescribed by the Department under the Act shall be guilty of a misdemeanor and, upon conviction, shall be fined not less than $50 nor more than $500. Each day upon which a violation of this Act occurs shall be considered a separate offense.

(2) A person who stores, treats, transports, or disposes of a hazardous waste in violation of this chapter, a rule adopted as authorized by this chapter, or an order issued as provided for in this chapter is subject to a civil penalty of not more than $25,000. Each day upon which a violation occurs is a separate violation.

3. Federal Regulations

The federal regulations concerning the proper management of solid waste are included in the "Resource Conservation and Recovery Act of 1976" (RCRA), which is documented as Public Law 94-580. The primary purpose of the law is to suggest guidelines for the proper disposal of solid and hazardous wastes generated in the nation and also to develop guidelines for the proper and safe recovery and re-use of recyclable materials found in the solid waste system.

One primary feature of RCRA is the method by which the new federal act is to be administered by the individual state governments through the assistance of the Environmental Protection Agency. Based on this premise, the State of Montana amended its laws and rules in 1977 to be in conformance with the new federal guidelines. Therefore, the State of Montana's laws and rules coincide quite closely with the new federal standards regarding solid waste management.

C. EXISTING SOLID WASTE SERVICES AND FACILITIES

For this study, several sources of information concerning the existing solid waste management practices in the area were identified. The primary sources that were utilized include: (1) interviews and discussions with local, state and federal officials directly responsible for the regulation and administration of the solid waste systems in the Seeley Lake area; (2) discussions with local officials and private citizens directly responsible for the operation and/or management of solid waste collection, transfer or disposal services and facilities; (3) on-site inspections by the consultant of all facilities and equipment pertinent to the management of solid waste; and (4) review of current and past reports and materials which have evaluated the existing systems and facilities. Included herein is a summary of the existing solid waste-related services and facilities available in the Seeley Lake Refuse District.

1. Collection

Currently, there are three refuse disposal services collecting and transporting solid waste within the Refuse District, all of which are privately operated. Included in the following narrative is a brief description of the various services available.

(a) Larson Transport and Disposal

Larson Transport and Disposal has an MRC permit to collect refuse from an area extending from Condon to Clearwater Junction. This private hauler utilizes an 18-cubic-yard rear-loading packer truck to collect wastes from residential and commercial units on a contract basis.

Each individual determines the number of times per month that his or her refuse must be collected, and charges are levied accordingly. Collection fees vary from $7.00 for monthly collection service to $11.75 for weekly collection. During the summer months, refuse is collected each Monday from customers located just north of Seeley Lake to Condon; each Tuesday from customers located in and around Seeley Lake proper and south along the east side of Highway 83 to Clearwater Junction; and each Wednesday from customers located along the western shore of Seeley Lake and along the west side of Highway 83 extending to Clearwater Junction.

Commercial customers may also determine the number of times refuse must be collected to meet their individual needs. Typically, refuse from commercial establishments is collected twice per week (Tuesday and Saturday) from May through September, and once per week during the remainder of the year. Mr. Larson leases or sells one- and one-half-cubic-yard containers to many commercial establishments and charges a dumping fee of $10.50 per hopper each time refuse is picked up.

The refuse is transported to and disposed of at the sanitary landfill in Missoula. Mr. Larson is charged a fee for dumping at this landfill.

(b) Placid Lake Area Collection Service

Private collection service is offered to the residents of the Placid Lake area by Mrs. Burgess. Weekly refuse collection service is available from mid-June through Labor Day for a cost of $30.00 per season. Approximately thirty customers utilize the collection service each season. Refuse is transported to and disposed of at the landfill in Ovando. Mrs. Burgess is charged a $5.00 fee each time refuse is disposed of at the Ovando site.

(c) City Disposal Company

City Disposal Company, headquartered in Missoula, also provides collection service within the Refuse District. City Disposal is presently under contract with the Forest Service to maintain several campgrounds and recreation sites within the Lolo National Forest. The contract is awarded each year, and the recipient must collect refuse from the sites according to a predetermined schedule. Additional information is contained in Section D, "Solid Waste Quantities", of this chapter.

2. Existing Public Disposal Facilities

Currently no sanitary landfill facilities are located within the Seeley Lake Refuse District. Refuse is transported by private haulers to the landfill in Missoula and, to a lesser degree, the landfill in Ovando.

The Pyramid Mountain Lumber Company utilizes a portion of its property for a landfill. Mill yard residue consisting primarily of bark and miscellaneous lumber scraps is either burned or deposited in the company landfill. At the present time, company officials estimate the remaining life of the landfill to be approximately five years. Research is currently underway on processes which would eliminate much of this refuse in the future by utilizing it in the manufacture of wood pulp.

D. SOLID WASTE QUANTITIES

1. General

An important and useful tool in the evaluation and design of any existing or proposed solid waste system and facility is the solid waste generation within the specific service area of the proposed facilities. If the quantities of solid waste generated in the past have been recorded, present and future quantities of waste can reasonably be projected. If such information is not available, alternate sources of information must be utilized to determine the quantity of waste annually generated within the area.

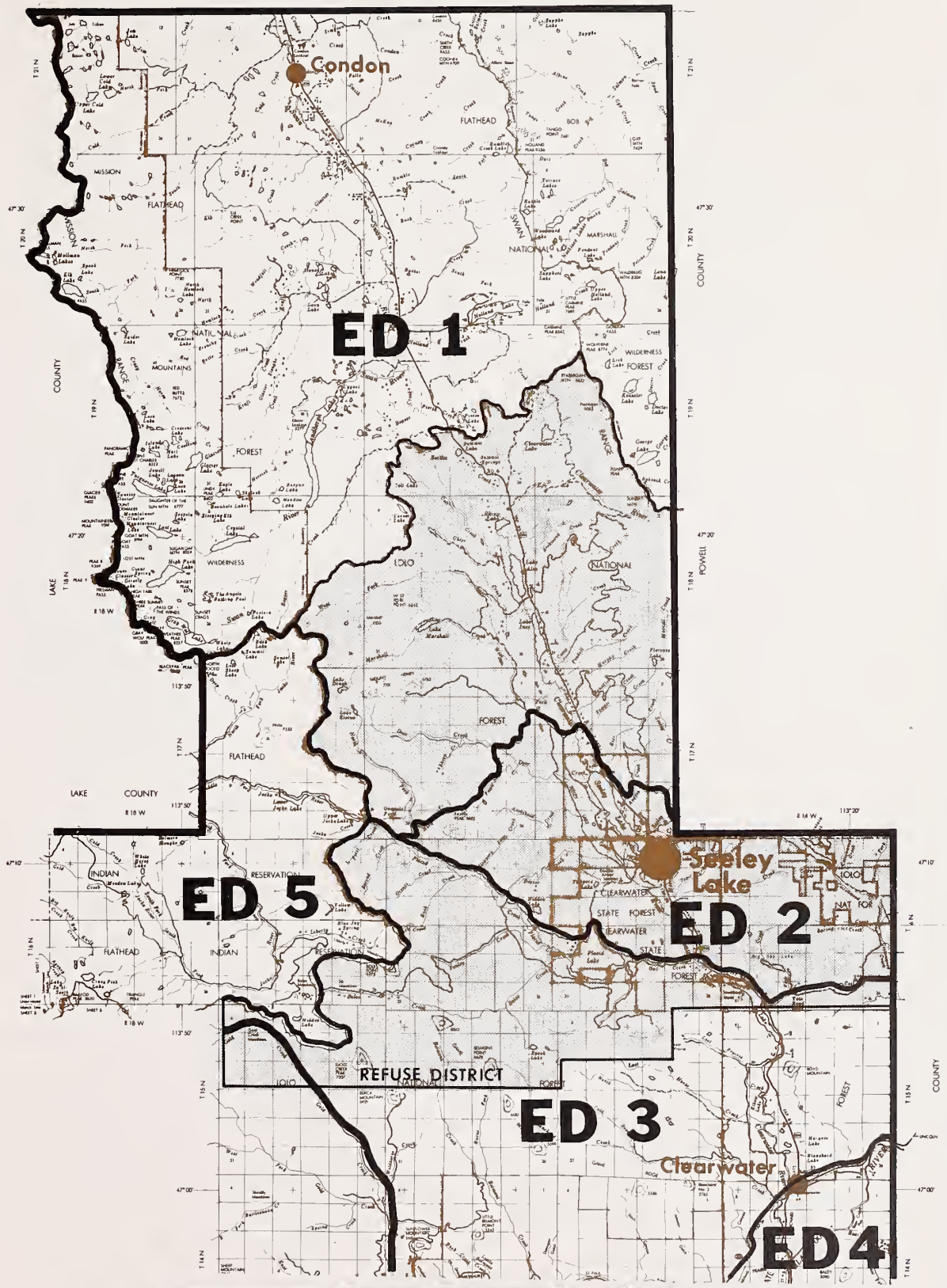
After discussing the waste disposal program with various local officials, it was determined that specific information regarding the quantity and characteristics of the wastes generated within the Seeley Lake Refuse District is not available. Therefore, in order to determine the waste quantities generated in the area, it is first necessary to obtain an accurate estimate of the current population and to identify major waste generation sources within the Refuse District. Waste quantities can then be determined by applying typical waste generation rates to the population of the area.

2. Population Analysis

(a) Background

Numerous sources of population information for the Seeley Lake area were obtained and reviewed. The majority of these sources do not have boundaries identical to the Refuse District boundary. Figure II-1 depicts the Seeley Lake Refuse District and its relationship to Census Enumeration Districts (note the lack of common boundaries). Even though many of the sources do not cover the exact study area, each merits review to obtain historical growth trends and to project local growth into the future. The following is a brief summary of the pertinent information obtained through the review and analysis of numerous sources of information.

* 1970 Census:	Population of rural Missoula County = 28,766 Seeley Lake - Blackfoot Valley Census Division population = 1,201; 556 housing units Average population/housing unit = 2.16 persons 36% of housing units in ED 2 (Seeley Lake area) were seasonal 1970 permanent study area population estimated to be 883
* DCA Population Projections:	Released in 1977 & 1978 for Montana cities & counties Used to obtain growth rates for Missoula County under three scenarios: high, medium and low growth
* 1980 Census :	Population of rural Missoula County = 42,591 (48% increase compared to 1970) Seeley Lake - Blackfoot Valley Census Division population = 2,000 (+66%); 1,360 housing units (+144%) Average population/housing unit = 1.47 persons
* Missoula Electric Co-op:	1,127 services in refuse district with approximately two-thirds permanent dwellings & remaining one-third seasonally related
* Blackfoot Telephone Co-op:	Serves area from Condon to Clearwater 529 services (Seeley Lake area - 1980) 305 services (Condon area - 1980) Increase in number of services since 1971 = 269% Examined company service records & projections



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Enumeration Districts

SEELEY LAKE REFUSE DISTRICT
SOLID WASTE MANAGEMENT PLAN

Figure II-1

* Seeley Lake Water District: 198 current users

(Generally add a minimum of 10 services per year to District)

* Miscellaneous: School enrollments have remained relatively stable even though local economy has fluctuated in recent years

High School = 135 - 150 students

Grade School = 180 - 200 students

NOTE: Interviews were conducted with numerous businessmen and developers to obtain an accurate picture of the local economy and area growth

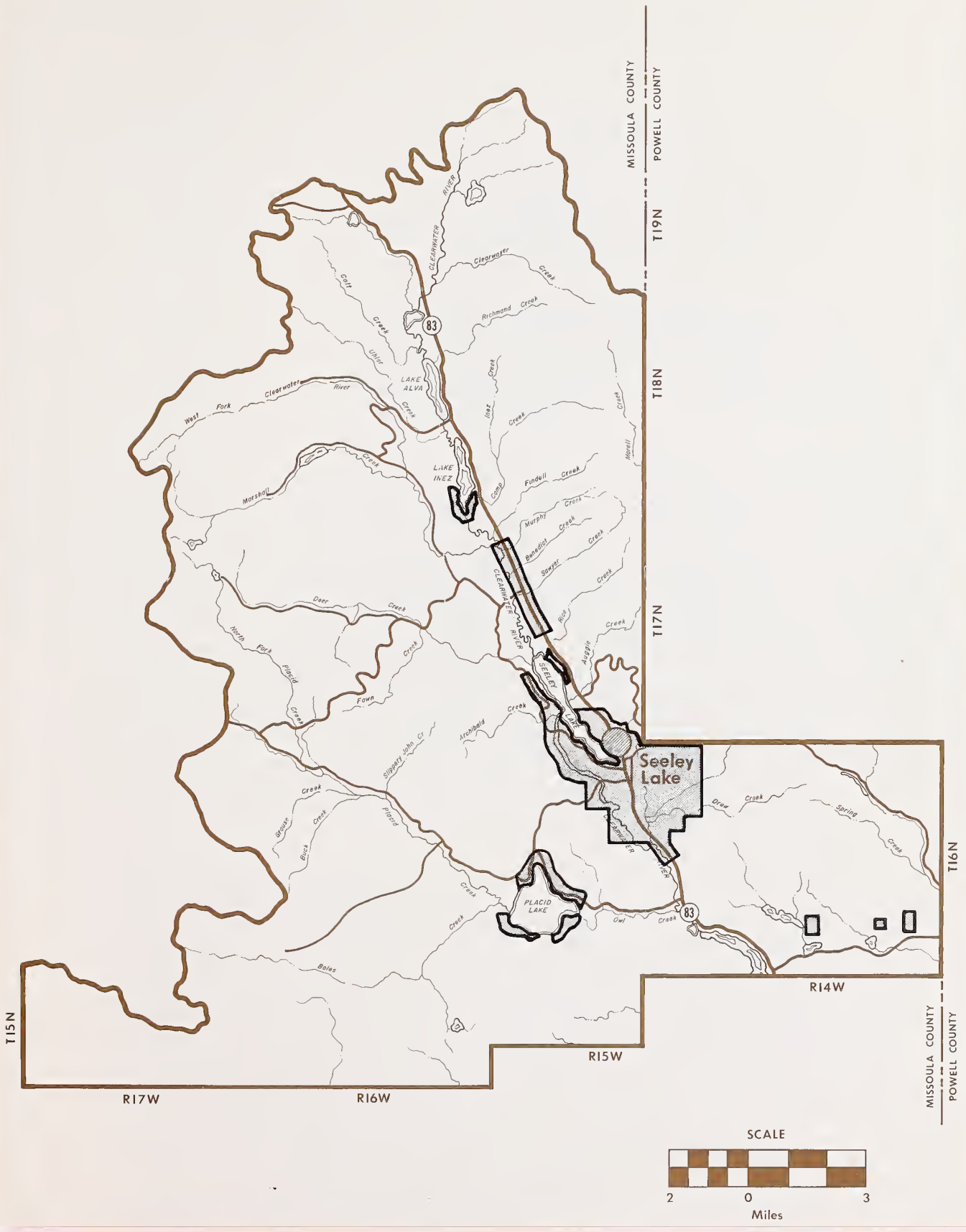
Due to the physical nature of the Seeley Lake area and the abundance of federal, state and corporate-controlled lands, development within the area has occured in scattered "pockets". In addition to the development which has occured in Seeley Lake proper, concentrations of population also exist around most major lakes in the Refuse District, north and south of Seeley Lake along State Highway 83, west of Seeley Lake along the Clearwater River, on the Double Arrow Ranch, and within numerous subdivisions on the benchlands east of Seeley Lake. Figure II-2 depicts these areas of development within the Seeley Lake Refuse District.

(b) Study Area Population

After reviewing the various sources of demographic and utility hookup information summarized herein, it was determined that the most appropriate and useful information that could be utilized to identify the population in the area was Missoula Electric Co-op, Incorporated's utility hookup information and the 1970 and 1980 Census data. Utilizing this information, it was possible to interrelate total housing units with past population estimates to determine the current and to project the future population in the Seeley Lake Refuse District. Included herein is a summary of the data and procedures utilized to identify current and to project the future populations in the study area.

(1) Current Population

To identify the Seeley Lake Refuse District's total number of housing units, the Missoula Electric Co-op's number of electrical services was utilized. This source of information was utilized for two reasons: (1) one of the co-op's rural service district boundaries coincides with the Seeley Lake Refuse District boundary; and (2) it is



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Population Concentrations

SEELEY LAKE REFUSE DISTRICT
SOLID WASTE MANAGEMENT PLAN

Figure II-2

assumed that almost all housing units in the area (seasonal or permanent) would have an electric service. Based on this information, the current number of total housing units for the refuse district was calculated as follows:

Number of Units		Description
1,037	-	Services at end of 1979
+ 90	-	Additional services during 1980
1,127	-	Total number of services
- 40	-	Less number of commercial services
1,087	-	Total number of housing units with electricity
+ 33	-	Estimated 3% of households without electric services
1,120	-	**Total Housing Units**

By utilizing 1980 census data regarding the average population per total number of housing units (1.47) and the total number of housing units for the study area (1,120), it is possible to estimate the permanent population of the study area for 1980. Utilizing this information, the permanent population is estimated to be 1,646 (1,120 x 1.47). A thorough review of this population estimate with the local officials indicates that this current estimate appears to be quite reasonable. It should be noted that it is virtually impossible to obtain an accurate count of the refuse district's population due to the non-coincidence of census district boundaries with the refuse district boundary, as was previously mentioned.

(2) Projected Population

In order to project the permanent population of the study area to the year 2000, it was first necessary to determine applicable growth rates. Growth rates were determined after census data and interviews with numerous local officials, businessmen and residents were completed. Projecting future populations for the Seeley Lake area is extremely difficult due to the overall nature of the economy, the economic dependence of the Seeley Lake area upon one major industry, and the ever-changing nature of area residents. It is difficult to foresee major "booms" or "busts" in the lumber industry; either cycle would have a dramatic effect upon the permanent population.

After evaluating several sources of information, it was the consultant's opinion that the most appropriate and logical method of projecting the refuse district's permanent population was to estimate the anticipated number of new housing units that

would be constructed over the foreseeable forecast period and multiply this number by the estimated average population per household occupying these dwelling units. Based on past census and utility service information, it is apparent that the increase in the number of new housing units constructed in the Seeley Lake Refuse District has risen at a very constant rate for the past ten-year period. According to this information, this rate equates to an increase of approximately 70 housing units per year. According to local officials and directors of the local utility companies, this average increase appears to be quite realistic for the foreseeable future. Based on this, the consultant utilized this estimate to project future populations in the area.

To estimate the future population which would correspond with the anticipated future number of housing units within the Seeley Lake Refuse District, it was necessary to identify an average population per household figure. Since more accurate information is not available, it was felt by the consultant that the average population per household data as depicted in the 1980 Census for the area is most appropriate, and thus was utilized to estimate future populations in the area.

Based on the projected increase in housing units and the current average population per housing unit figure of 1.47 persons, the projected number of permanent residents in the Seeley Lake Refuse District was estimated. Summarized in Table II-1 are these projections.

TABLE II-1

POPULATION FORECAST SUMMARY

Year	Total Housing Units [1]	Population per Housing Unit [2]	Permanent Population
1980	1,120	1.47	1,646
1985	1,470	1.47	2,160
1990	1,820	1.47	2,675
1995	2,170	1.47	3,190
2000	2,520	1.47	3,704

1 Projections based on an additional 70 housing units built each year for the forecast period

2 Based on 1980 Census data

(c) Seasonal Population

After reviewing several sources of information including the 1970 and 1980 Census data and the utility service information, it was determined that approximately 36 percent of the total housing units in the Seeley Lake Enumeration District are considered seasonal, with the remaining 64 percent comprising permanent dwelling units. Based on this information, coupled with the fact that it is estimated that there are currently 1,120 total housing units in the area, it can be assumed that there are 409 seasonal housing units and 711 permanent housing units located within the Seeley Lake Refuse District.

As everyone residing in the Seeley Lake area is well aware, the population during the summer months is substantially higher than during the winter months. Based on the housing information summarized above, it is possible to estimate the peak seasonal population in the area by multiplying an average occupancy rate by the total number of seasonal housing units. Through several conversations with local officials, it was determined that an average occupancy rate of 3.0 persons per seasonal housing unit is applicable. Based on this, it is possible that the total population in the Seeley Lake Refuse District could increase by as many as 1,227 people (409 seasonal units x 3.0 persons/unit). This would represent a possible 75 percent increase compared to the estimated permanent population of 1,646.

It is obvious that this peak population increase will not occur except perhaps during the summer holiday periods. However, in order to size solid waste handling facilities, the peak waste generation conditions must be anticipated and correspondingly designed for. It should be noted, however, that to estimate the annual average quantity of waste generated in the study area, average occupancy criteria must be developed for the seasonal housing units. These projections, as well as the estimates developed for the other waste generation source categories, are discussed in more detail in the following paragraphs.

3. Permanent Population Waste Generation

An important and useful tool in the evaluation and design of any existing or proposed solid waste system is the per capita generation, or the pounds per capita per day of solid waste generated in the area. If the quantities of solid waste generated in the past have been weighed and recorded, present and future quantities of waste can reasonably be projected.

From the consultant's experience and from studies completed by various governmental

groups, it has been determined that the generation rate per capita varies with population density. Large urban areas generate a high per capita rate because of the industrial and commercial wastes. Rural areas with little or no commercial or industrial activity generate relatively small amounts of refuse. Such solid wastes usually consist of only household wastes. Small towns generally have some commercial wastes, but have very little industrial waste. An analysis of the waste generation information that has been compiled for this project as well as for previous solid waste-related projects in the state illustrates this point very well. Summarized in the following text is a brief description of waste generation data which was determined applicable for the study area.

(a) Existing Disposal Site Data

Existing solid waste quantity information for a portion of the Seeley Lake area is available to some extent. Larson Transport & Disposal, the private collection service in the area, disposes of its refuse at the private landfill in Missoula and dumping fees are based upon the quantity of solid waste deposited at the landfill. Solid waste quantities by month were obtained for 1978 and 1979; additional data for 1980 was incomplete at the time of analysis. Although only one-third of the residents of the Seeley Lake Refuse District utilize the collection service, it is assumed that the waste generation characteristics of these residents is representative of the residents of the Refuse District. Table II-2 summarizes the quantity information obtained for 1978 and 1979.

Through discussions with Mr. Larson, it was determined that approximately 40 percent of the total waste collected by the private hauler each year is generated by commercial establishments. In order to obtain a true per capita waste generation rate for the residents utilizing the collection service, it was necessary to exclude commercial wastes. The total quantities of solid waste generated by the residents utilizing the collection service during 1978 and 1979 amounted to approximately 188 tons after the commercial wastes were subtracted.

The number of permanent and seasonal units utilizing the private collection service during 1978 and 1979 was obtained from Mr. Larson. By using average population per unit figures and appropriate occupancy rates, it was possible to derive the average annual number of occupied person-days utilizing the private refuse service during the two-year period. By then dividing this figure by the average annual quantity of waste collected over this period from these residents, it was possible to calculate the average residential waste generation rate (lbs./capita/day) for the two-year period. As indicated in the calculations

TABLE II-2

SOLID WASTE QUANTITIES
(Larson Transport and Disposal) [1]

Month	1978			1979			Average Tonnage	
	No. of Cubic Yards	Tonnage[2]	Seasonally Adjusted Tonnage[3]	No. of Cubic Yards	Tonnage[2]	Seasonally Adjusted Tonnage[3]	2-Year Average Tons/Month	Percentage of Total
Jan.	60	15.0	15.0	154	38.5	38.5	26.8	8.3
Feb.	79	19.8	19.8	90	22.5	22.5	21.2	6.6
March	72	18.0	18.0	65	16.3	16.3	17.2	5.3
April	(est)70	17.5	17.5	105	26.3	26.3	30.6	9.5
May	54	13.5	13.5	180	45.0	45.0	29.3	9.1
June	143	35.8	32.4	160	40.0	26.5	29.4	9.1
July	164	41.0	37.6	200	50.0	36.5	37.0	11.5
Aug.	156	39.0	35.6	185	46.3	32.8	34.2	10.6
Sept.	182	45.5	42.1	150	37.5	24.0	33.1	10.3
Oct.	96	24.0	24.0	122	30.5	30.5	27.2	8.4
Nov.	143	35.8	35.8	18	4.5	4.5	20.2	6.3
Dec.	90	22.5	22.5	38	9.5	9.5	16.0	5.0
Total:	1,309	327.4	313.8	1,467	366.9	312.9	322.2	100%

1 Waste quantities obtained from City Disposal Company, Missoula. 1980 data incomplete

2 Based on a conversion of 500 lbs./cubic yard

3 Quantities generated at State campgrounds not included in 1978 data. Quantities generated at Forest Service sites and state campgrounds not included in 1979 quantities.

below, the average waste generation rate for those residents utilizing the private waste disposal service during the two-year period (1978 - 1979) was approximately 2.00 lbs. per day (1.994).

PRIVATE REFUSE SERVICE

WASTE GENERATION SUMMARY
(Average 1978 - 1979)

A. PERTINENT DATA:

Residence Type	No. of Customers[1]	Avg. Population per Customer[2]	Avg. Occupancy Rate (days)	Total Person/Days
Permanent	198	2.31	365	166,944
Seasonal	59	3.00	122	21,594
Total:	257	–	–	188,538

B. WASTE GENERATION CALCULATION:

$$\frac{\text{Average Annual Waste Collected}}{\text{Total Occupied Person/Days}} = \frac{\text{188 tons x 2000 lbs.}}{\text{188,538}} = \text{1.994 lbs./person/day}$$

1 Based on information obtained from private refuse service

2 Based on previous population data and discussions with local officials

(b) Other Available Waste Generation Data

Other sources of information may be very useful in determining waste generation rates in the study area. Investigations completed by other consultants and state agencies were obtained and reviewed. The most applicable and accurate solid waste generation data available is from detailed waste generation studies which were conducted for the State in

conjunction with the State of Montana Solid Waste Management and Resource Recovery Study completed in December, 1976. Detailed investigations were conducted at several landfill sites statewide where the types, quantities and origins of the waste were recorded. Based on this information, average waste generation rates for the various communities that utilized each site were determined by dividing each community's total wastes by the estimated population in the community. It was determined that there is a definite correlation between the population of the individual community and the corresponding waste generation rate. The following table summarizes the average waste generation rates determined applicable through these detailed investigations.

STATE OF MONTANA [1]

AVERAGE WASTE GENERATION RATES
(lbs/person/day)

Populations	Residential	Commercial/ Industrial	Demolition Debris, etc.	Total
Greater than 5,000	2.30	2.30	1.10	5.70
1,000 to 5,000	2.20	0.50	0.55	3.25
Less than 1,000 and Rural Population	2.00	–	0.25	2.25

[1] Source: *Population, Employment and Waste Generation Report for the State of Montana Solid Waste Management and Recovery Study*, December, 1976.

(c) Waste Generation Summary

After comparing the waste generation data that was compiled utilizing the local waste quantity information with the statewide waste generation rates, it was determined that the waste generation rates and quantities developed from the local data appear to be quite reasonable and accurate. Based on this, the waste generation rate of 2.00 lbs. per capita per day will be utilized to determine the current and future waste quantities generated by

the residential population within the study area. In regard to the waste generated by the local businesses and commercial establishments, it appears to be quite valid and accurate to utilize the current waste quantity data as itemized by the local refuse hauling service to identify these respective waste quantities.

4. Seasonal Waste Generation

(a) General

Tourism is extremely important to many areas of Montana, the Seeley Lake area being no exception. Numerous recreational opportunities ranging from hunting and fishing to camping and skiing are available in the area. The overall scenic beauty, the numerous lakes in the area, and the abundant recreational pursuits at hand are probably the area's leading vacation attractions. (The number of vacation homes utilized throughout the year is increasing as wintertime recreational opportunities in the area are expanding). Although these seasonal populations provide significant impacts on the local economy, other effects may be associated with the seasonal influx of poeple. The following section briefly discusses the impact the seasonal population has on the solid waste generation in the area.

(b) Seasonal Housing Units

The impacts that the inhabitants of the many vacation and second homes in the area have upon the Seeley Lake area is quite dramatic. When one considers that approximately 40 percent of the total number of housing units in the area are classified as seasonal units, it is very evident that large fluctuations in the population occur, especially during the summer. In order to estimate the quantity of refuse generated by this group, it is first necessary to determine the number of seasonal inhabitants at any given time during the year.

Although occupancy of seasonal units may approach 100 percent during some of the summer holiday weekends, it is doubtful that each unit is fully occupied throughout the summer. The occupancy during the remaining months of the year is expected to be reasonably low. Based on conversations wit local officials and residents, it can be assumed that, during the summer months, an average of 50 percent of the seasonal units are occupied. For the remainder of the year, it can be estimated that about ten percent are occupied. Utilizing these estimates, it can be assumed that each summer housing unit would be occupied, on the average, 23 percent of the time.

To estimate the waste quantities generated at these seasonal housing units, it can be assumed that the same per capita waste generation rate that was determined applicable for

the permanent population would apply. Utilizing this assumption coupled with the estimate that, on the average, three persons would occupy each seasonal unit for 23 percent of the year, quantities of waste generated from the seasonal units can be calculated. Based on these criteria and assumptions, it is estimated that approximately 103 tons of refuse would be generated annually from the 409 seasonal housing units located within the study area.

(c) State and Federal Facilities

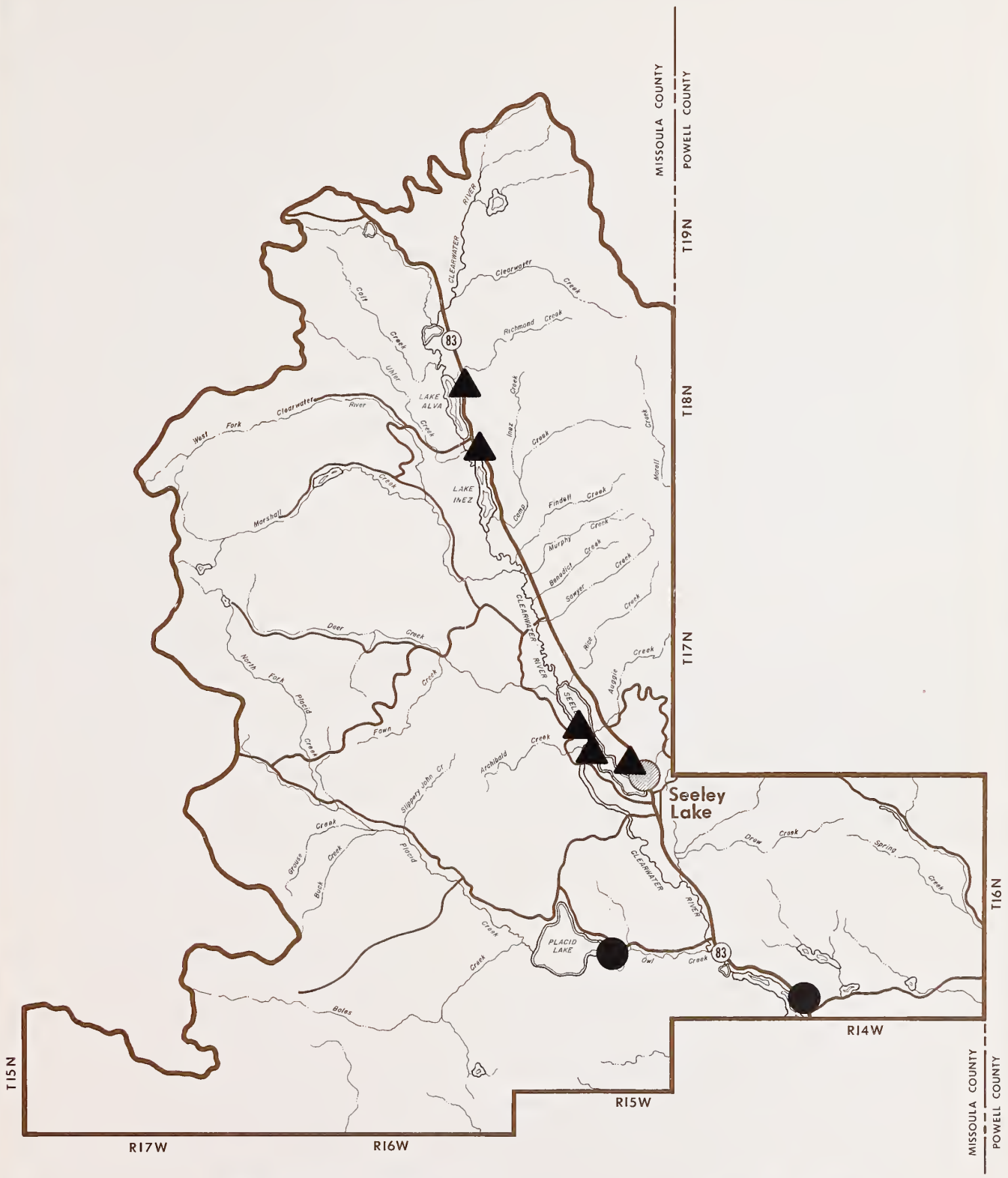
Throughout the study area, numerous recreation sites exist on federal, state and privately owned lands. The quantities of waste generated at these sites is small when considered individually, but collectively they constitute a substantial volume and must be dealt with accordingly. A basic inventory of existing recreation sites was completed with the assistance of several sources including existing maps and interviews with various governmental agencies and private individuals. The recreation sites within the Seeley Lake area are depicted in Figure II-3.

The following section briefly summarizes the existing number and operational procedures of the recreation sites under the management of the various governmental agencies. Estimates of the current quantities of solid waste generated at the sites are also presented in the following narrative.

(1) U.S. Forest Service

A substantial portion of the study area is comprised of land under the jurisdiction of the U.S. Forest Service. The Forest Service maintains six recreation areas within the Seeley Lake Ranger District of the Lolo National Forest. Maintenance of each site is contracted out to a private collection and disposal service(s) each year. At the present time, City Disposal Company, headquartered in Missoula, is servicing the sites. Each site is equipped with several one- and one-half-cubic-yard containers (dumpsters) which are collected once per week during the peak summer months and on a pre-determined schedule during the remainder of the camping season. The refuse collected from the recreation sites is then transported to the sanitary landfill in Missoula. Additional cleanup during the spring and fall is handled by Forest Service personnel. The pack in/pack out policy is also observed throughout the Bob Marshall and Scapegoat Wilderness Areas.

All Forest Service maintained sites and work camps within the Seeley Lake Ranger District are estimated to generate approximately 59 tons of solid waste each



RPA

Robert Peccia & Associates

Helena — Havre

Recreation Sites

SEELEY LAKE REFUSE DISTRICT
SOLID WASTE MANAGEMENT PLAN

Figure II-3

year. It is estimated that 40 of the 59 tons of refuse are generated at campgrounds located within the Seeley Lake Refuse District, with the remaining wastes generated at the campgrounds located near Condon.

(2) State of Montana Fish, Wildlife and Parks Department

State-managed campgrounds and recreation facilities are located at Placid and Salmon Lakes. Refuse collection and disposal is contracted to private disposal services on a yearly basis. Currently, Larson Disposal and Transport of Seeley Lake collects refuse once per week from each of the two sites from May through October. The campgrounds are equipped with three-cubic-yard containers and numerous trash cans, which are emptied into the larger containers by State personnel. Periodic maintenance of the sites occurs during the rest of the year, and waste collected at this time is transported to and disposed of at the divisional office located on the Blackfoot-Clearwater Game Range. Based on conversations with Department officials and the private hauler, it is estimated that 14 tons of refuse are generated annually at these state facilities.

(d) Other Concerns

In addition to the summer cabins and the federal and state recreation sites, numerous resorts and guest ranches are located in the Seeley Lake area. These facilities are utilized a great deal during the summer months and during the hunting season. The majority of private concerns are located in or near Seeley Lake, and refuse generated at each is collected by the contract hauler in Seeley Lake. These wastes have been considered as "commercial" wastes for the purposes of this study.

5. Total Waste Quantity Summary

Based upon the investigations that were conducted, the waste generation rates and the projected future populations of the study area, current and future solid waste quantities were projected through the year 2000 for the Seeley Lake Refuse District. Obviously, the populations and waste generation rates that were utilized to project the future waste quantities may change dramatically within the next 20-year period; however, at this time it is felt that the projected populations, waste generation data, and assumptions utilized to project waste quantities are logical and will yield reasonable projections. Table II-3 summarizes the waste quantity projections by source through the year 2000.

6. Seasonal Variation in Solid Waste Quantities

The generation of solid waste in the study area fluctuates dramatically from season to

TABLE II-3

SOLID WASTE QUANTITIES

(Tons/Year)

Generation Source	YEAR 1980	1985	1990	1995	2000
Permanent Waste Generators					
Permanent Residents [1]	601	788	976	1,164	1,352
Commercial Establishments [2]	125	144	165	190	219
Subtotal:	726	932	1,141	1,354	1,571
Seasonal Waste Generators [3]					
Seasonal Population	103	135	167	199	232
Forest Service Campgrounds	40	42	44	46	49
State Campgrounds	14	15	15	16	17
Subtotal:	157	192	226	261	298
TOTAL:	883	1,124	1,367	1,615	1,869

1 Based on current and projected populations and a waste generation rate of 2.00 lbs./capita/day.

2 Based on current estimates from Larson Disposal Service. Future quantities based on three percent per year increase.

3 Based on waste generation criteria included in text of report. Future quantities based on a one percent per year increase with the exception of the seasonal population category. The seasonal population quantities are based on the projected number of new seasonal housing units.

season. As discussed previously, there are two primary sources of waste generated in the area: (1) the wastes generated by permanent residents and the associated commercial establishments; and (2) the refuse resulting from seasonal recreational activity in the area. Figure II-4 depicts the seasonal fluctuation in solid waste quantities for the Seeley Lake Refuse District. The monthly figures are based upon the analysis of existing waste quantity information obtained from the private refuse collection service for 1978 and 1979. The effect that seasonal generation sources have on solid waste quantities is very apparent. As can be noted, the waste generation fluctuates by a factor of nearly three times from December to July.

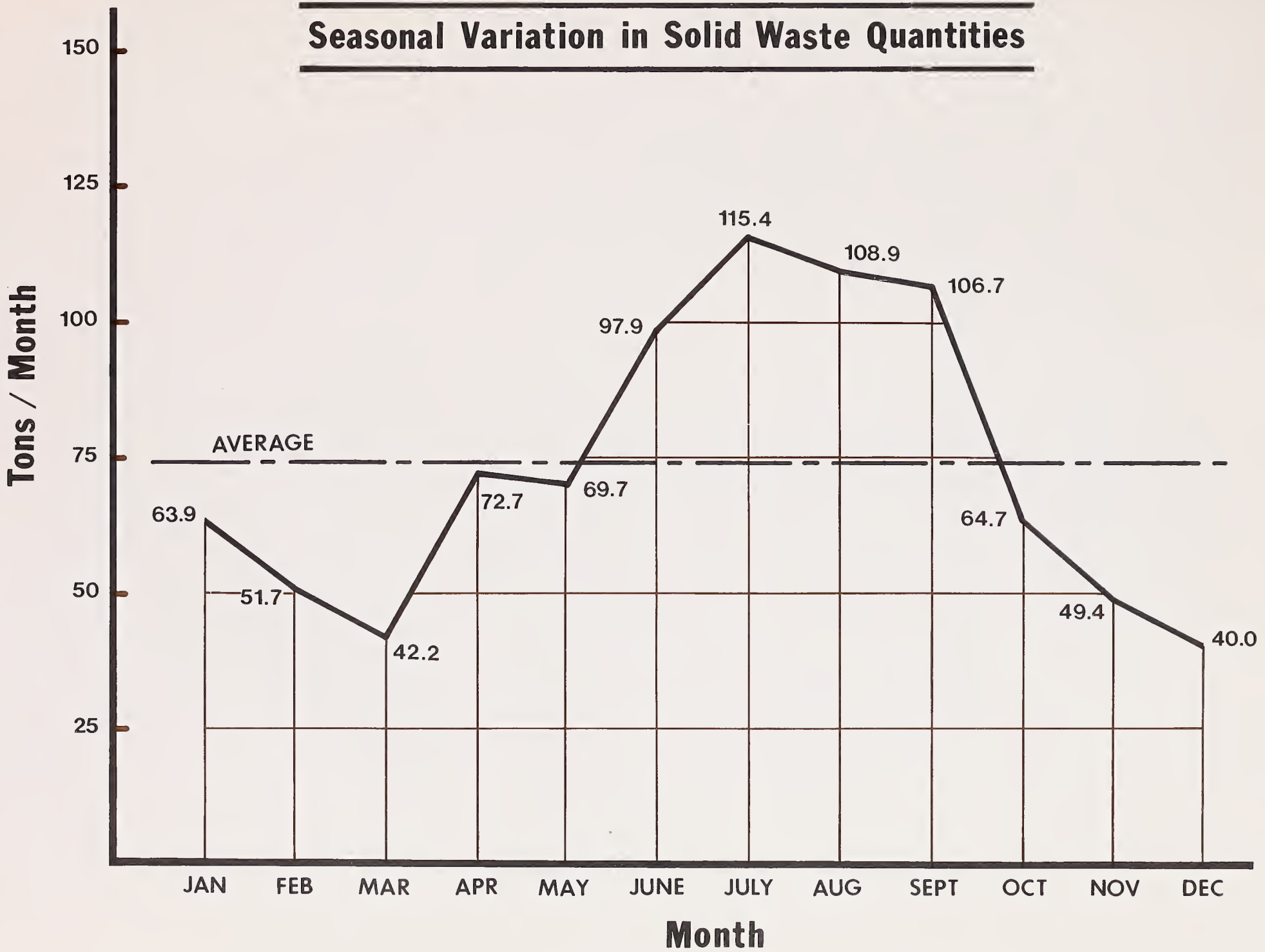

Seasonal Variation in Solid Waste Quantities
Tons / Month
150
125
100
75
50
25
AVERAGE
63.9
51.7
42.2
72.7
69.7
97.9
115.4
108.9
106.7
64.7
49.4
40.0
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
Month

Figure II-4

PART THREE

EVALUATION OF ALTERNATIVE DISPOSAL SYSTEMS

PART THREE

EVALUATION OF ALTERNATIVE DISPOSAL SYSTEMS

A. GENERAL

The purpose of this chapter of the study is to evaluate in depth those solid waste transfer and disposal concepts which appear to be most applicable for economically solving the inefficiencies and deficiencies of the existing disposal methods in the Seeley Lake Refuse District. Currently throughout the nation there are a multitude of concepts being utilized to process, transfer, incinerate and dispose of solid waste. In most instances the local topographic, climatic, sociologic and political conditions dictate which alternative(s) is most practical and economical for the area.

Through a detailed literature search, on-site investigations and the Consultant's past experience, it was determined that three general concepts have potential applicability in the Seeley Lake Refuse District. These include: 1) sanitary landfills; 2) transfer systems; and 3) incineration with heat recovery. Several other alternatives including shredding, air classification, incineration without heat recovery, composting and methane recovery from landfills, to mention a few, were preliminarily evaluated but eventually eliminated from serious consideration due primarily to the relatively small volumes of waste generated in the District and/or the lack of a proven "track record" for the installations that have been in operation in the past several years.

To evaluate the various alternatives which were determined applicable for the District, initially a basis of design and cost estimates were prepared for the various system cost components included for each potentially applicable alternative. Basically, the system cost components for each alternative included two major elements: 1) capital and annual costs for major facilities determined necessary; and 2) transportation costs, including labor, depreciation and operation expense to operate vehicles involved in the transportation of solid wastes from the Seeley Lake area to the landfill site.

Included in Section B of this chapter is a detailed description of the basis of design and cost estimates for the various system cost components that were prepared for this project. This information was then utilized as the basis for evaluating the specific alternatives which were determined potentially applicable for the District. These specific system cost analyses are included in Section C of this chapter.

B. DESCRIPTION OF APPLICABLE ALTERNATIVES

1. Design Criteria

When designing a solid waste transfer or disposal facility, the two major criteria that must be evaluated include: 1) the anticipated annual quantities of solid waste generated and the corresponding generation sources; and 2) the seasonal variation of the wastes generated. These appropriate waste generation criteria were developed in Part Two of this report and are summarized below in Table III-1.

TABLE III-1

SEELEY LAKE REFUSE DISTRICT
ALTERNATIVES ANALYSIS

BASIS OF DESIGN

I. SOLID WASTE QUANTITIES (Tons/Year)

	SOURCE	YEAR 1980	2000
1.	Permanent Residents	601	1,352
2.	Commercial Establishments	125	219
	Subtotal:	726	1,571
3.	Seasonal Population	103	232
4.	Forest Service	40	49
5.	State Campgrounds	14	17
	Subtotal:	157	298
Total:		883	1,869

II. SEASONAL VARIATION (Tons/Month)

	1980	2000
Peak (July)	115	243
Low (December)	40	85
Average	74	157

2. Evaluation of Applicable Facilities

(a) Sanitary Landfill

As previously discussed in Part Two of this report, numerous attempts have been made over the past several years to locate and properly maintain a sanitary landfill in the Seeley Lake area. Due to high groundwater problems, extremely high expenses and operational problems perpetuated by nuisances as a result of bears frequenting the landfill sites, all sites that have been utilized over the past ten years have been closed.

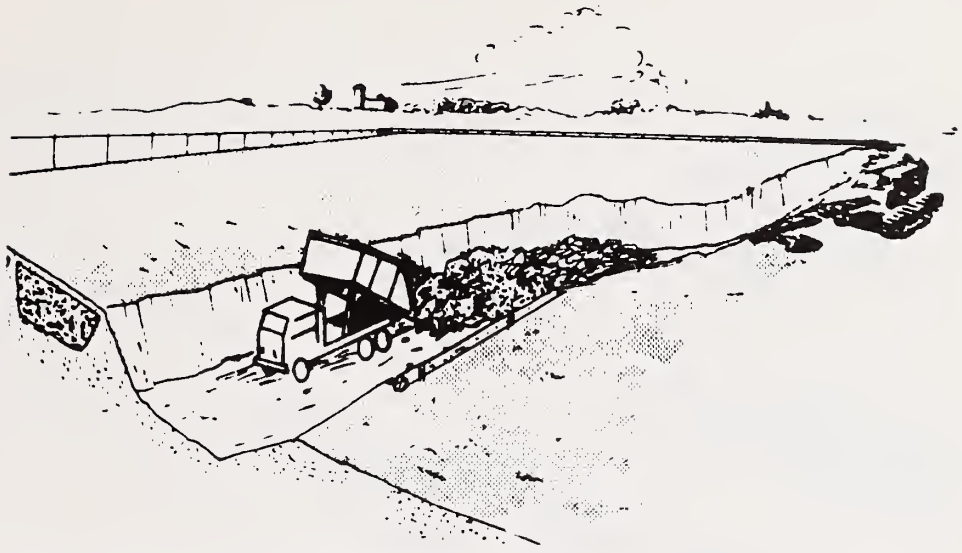
At this point in the study, it was attempted to estimate the capital and annual cost to locate and operate a sanitary landfill in the Seeley Lake area. Through research and practical operating experience, it has been determined that there are a variety of methods for operating a sanitary landfill. The two most prominent methods are the trench and area methods. The trench method basically consists of excavating trenches with a dozer and/or scraper and stockpiling the soil for use as cover material. Solid waste is then placed into the pre-excavated trenches, compacted, and covered each operating day with four to six inches of the stockpiled cover soil. This method is primarily used in areas where the terrain is relatively flat. Figure III-1 depicts a schematic of this type of operation.

The area landfill method differs from the trench method in that minimal site preparation is required. In this method, individual cells are constructed in various areas throughout the site until the entire site is filled. Each cell represents the waste received during one operating day. Cover material is excavated from areas adjacent to the working face of the active fill areas and is deposited over the previous compacted refuse. Figure III-2 illustrates this type of landfill method.

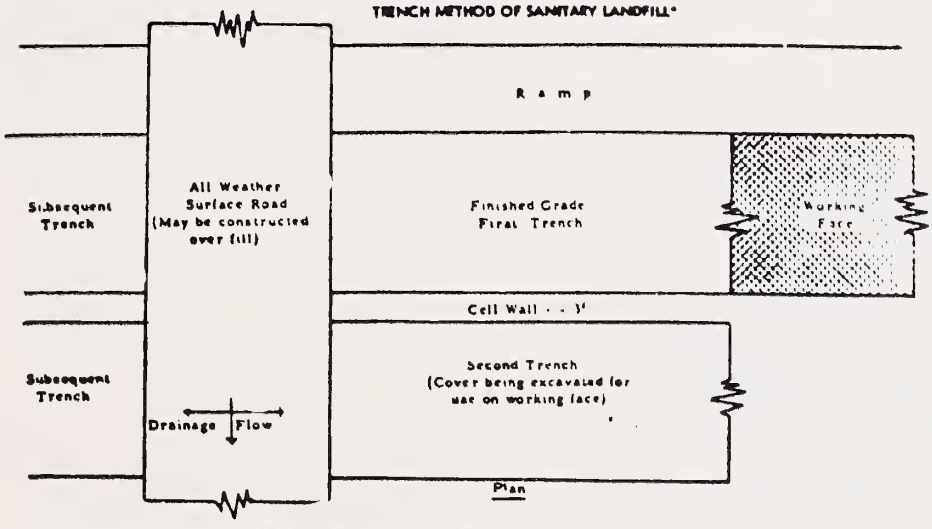
For this project it was attempted to estimate the costs of operating a landfill based on the utilization of the trench method. This type of landfill procedure is most common in Montana and has been utilized quite successfully when current regulations and operating criteria are followed. The estimated capital and operational costs that were determined to be appropriate for the Seeley Lake area are summarized in Table III-2.

For the costs that are depicted in Table III-2, the following basic assumptions were made and utilized: 1) no current landfill facilities exist, and thus all necessary site improvements required to start a landfill would be necessary; 2) a used track-type dozer would be purchased, leased or contracted for moving, compacting and covering the waste with soil; 3) the site would be open two days per week from October 15 to May 15 and four days per week from May 16 to October 14; 4) no gate attendant would be on duty during the operating hours of the landfill, but one individual would be on-site for two hours each day the site was open to monitor dumping activities and operate the dozer to provide daily maintenance and soil cover; and 5) the excavation of trenches and necessary road maintenance would be contracted as deemed necessary.

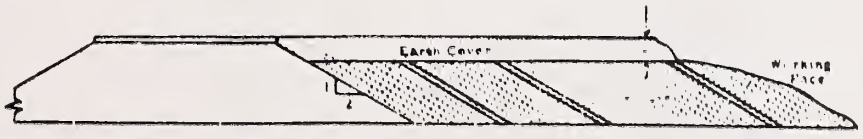
SANITARY LANDFILL
TRENCH METHOD



TYPICAL ILLUSTRATION



TYPICAL PLAN VIEW

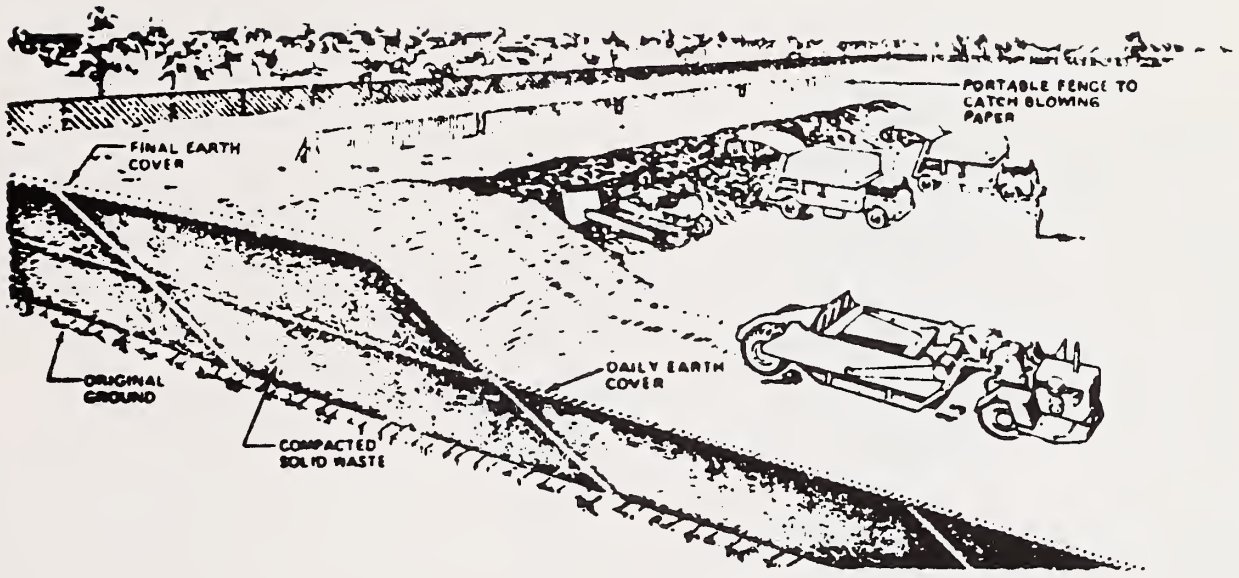


TYPICAL ELEVATION VIEW

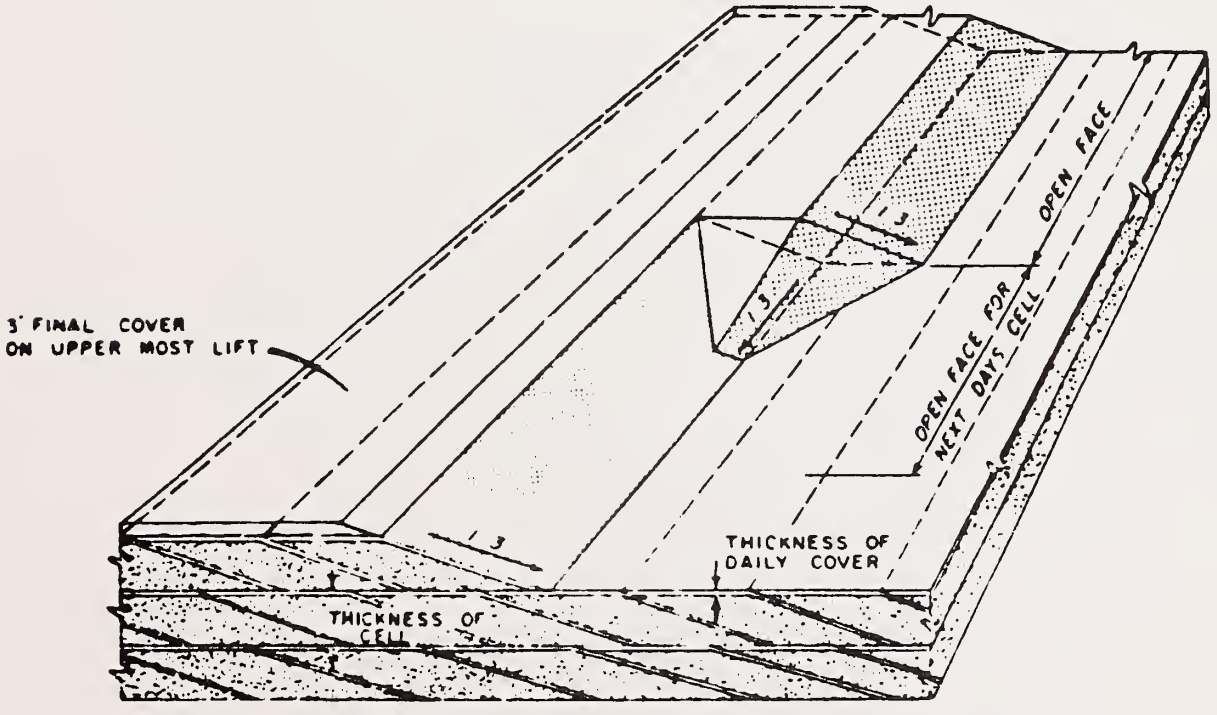
Source: State of Montana Solid Waste Management and Resource Recovery Study, August, 1976

Figure III-1

SANITARY LANDFILL
AREA METHOD



TYPICAL ILLUSTRATION



TYPICAL PLAN VIEW

Source: State of Montana Solid Waste Management and Resource Recovery Study, August, 1976

Figure III-2

TABLE III-2

SANITARY LANDFILL COST SUMMARY

CAPITAL COSTS

Item	Units	Unit Cost	Total Cost
Land	8 ac.	$3,000/ac	$24,000
Sitework	Lump Sum (L.S.)	–	4,000
Fencing	1,600 ft.	$2.50/ft.	4,000
Roads	1,000 ft.	$15.00/ft.	15,000
Building	1,000 sq.ft.	$15.00/sf	15,000
Utilities	L.S.	–	500
Contingency	L.S.	15%	9,500
TOTAL CAPITAL COST:			$72,000

ANNUAL COST
(148 days/yr.)

Item	Units	Unit Cost	Total Cost
Site & Road Maintenance	L.S.	–	$ 500
Dozer Depreciation, Operation & Maintenance	296 hrs. [1]	$45/hr.	13,320
Labor	296 hrs.	$10/hr.	2,960
Utilities	L.S.	–	400
Insurance	L.S.	–	500
Trench Excavation	3,700 cu. yds.	$2.00/cy	7,400
Subtotal:			25,080
Amortization of Capital (12% - 20 yrs.)			9,650
TOTAL ANNUAL COST:			$34,730

[1] Based on two hours per each day the site is open.

As depicted in Table III-2, the initial capital required to start a new landfill site is estimated to be $72,000. The corresponding annual cost including the amortization of the capital investment is estimated to be $34,730. Obviously, these costs are estimates and will vary, depending on the actual siting requirements and costs of a specific landfill site as well as the operating criteria implemented by the District.

(b) Transfer Systems

As an alternative to locating a sanitary landfill in the immediate Seeley Lake area, a potentially usable disposal alternative that was evaluated includes the use of a transfer system. Under this alternative, a transfer facility would be located in the Seeley Lake area, preferably as close to Seeley Lake as possible, to reduce individual haul costs. Area residents could then periodically bring their solid wastes to this transfer facility. These wastes would then be transported by specially designed transfer vehicles to the closest licensed sanitary landfill for disposal.

After a thorough review and analysis of the available transfer systems in operation today throughout the country, it was determined that three transfer systems warranted an in-depth cost analysis. Included herein is a brief description of these three systems.

(1) Green Box Container System

This system includes the use of metal containers varying in size from four cubic yards to ten cubic yards. The wastes deposited in these containers are emptied as required and transported to an areawide disposal site utilizing either a rear-loading, side-loading, or front-loading packer vehicle.

For this alternative, it was determined appropriate to locate 25 four-cubic-yard containers at a designated area near Seeley Lake. In order to handle the anticipated volume of waste generated, the containers would have to be emptied 162 times per year under current waste generation volumes. The estimated capital cost to purchase these containers as well as the estimated annual amortization and maintenance costs of these containers are depicted in Table III-3.

(2) Roll-Off Container System

This system includes the use of large metal containers, usually varying in size from ten to forty cubic yards. Under this system, the containers are loaded and transported to an areawide landfill where the wastes are dumped from the container with a tilt-frame vehicle specially designed for that purpose. Because of the size of the containers, special improvements at the container site including a retaining wall,

TABLE III-3

GREEN BOX CONTAINER SYSTEM
FACILITY COSTS

(Four-Cubic-Yard Containers)

1. Capital Cost:

25 Containers x $500 each = $12,500

2. Annual Cost:

(a) Amortization (10 years @ 12%)	$2,210
(b) Maintenance of Containers ($25/container/year)	620
Total:	$2,830

TABLE III-4

ROLL-OFF CONTAINER SYSTEM
FACILITY COSTS

(Forty-Cubic-Yard Containers)

1. Capital Costs:

Item	Cost
Land	$3,000
Sitework & Ramp	3,000
Concrete Slab & Wall	7,000
Shelter	3,000
Container	5,000
Contingency	2,000
Total:	$23,000

2. Annual Cost:

(a) Amortization (20 years @ 12%)	$3,080
(b) Maintenance of Site	200
Total:	$3,280

ramp and concrete pad, are necessary. Because of the high volumes of snow which occur in the Seeley Lake area, it was also determined appropriate by the Consultant to construct a shelter over the container and loading area. A site layout of such a container site is depicted in Figure III-3.

For this alternative, it was determined appropriate to locate one container site in the Seeley Lake area. Based on the current waste quantities generated in the area, it was also determined appropriate to locate one 40-cubic-yard container at the site at one time. Based on current waste generation figures, it is estimated that a 40-cubic-yard container would be filled with waste 243 times during the year and thus would require loading, transporting and emptying at an areawide landfill. The estimated capital and annual costs to provide and maintain a 40-cubic-yard roll-off container site are summarized in Table III-4.

(3) Transfer Station System

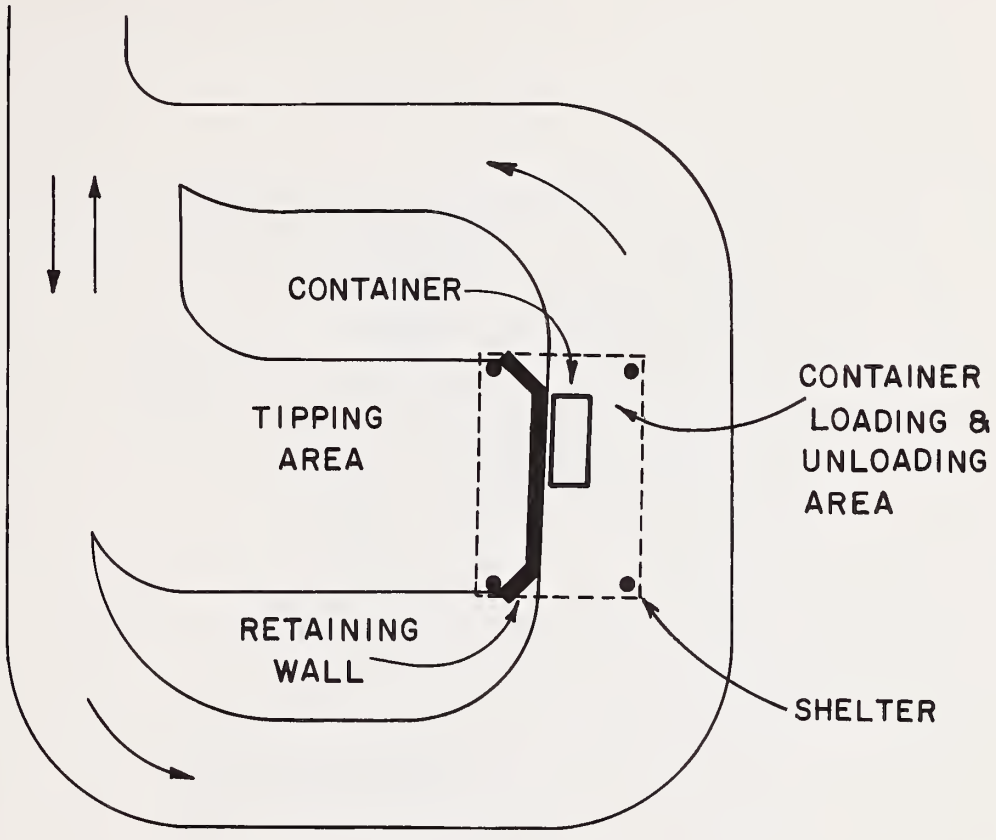
This alternative consists of utilizing an enclosed dumping area, a charging hopper, and a transfer vehicle. The wastes that are brought to the facility are deposited on an enclosed concrete tipping floor. A front-loader or "bobcat" then pushes the deposited wastes into a hopper. This waste in turn flows by gravity into a transfer trailer located under the hopper, where the waste is compacted by a low-density compaction unit mounted on the trailer. When the trailer is filled, a tractor is then connected to it and the trailer is transported to a waste disposal site. A site layout of such a facility is depicted in Figure III-4.

The capital and annual operational costs for such a facility are itemized in Table III-5. It should be noted that the costs included in the table assume that the transfer station would be open the same number of days as the previously discussed sanitary landfill alternative; four days per week during the summer and two days per week for the remainder of the year. The costs also assume that an attendant would be on duty for two hours each operating day to operate the "bobcat" as well as the trailer-mounted compaction equipment.

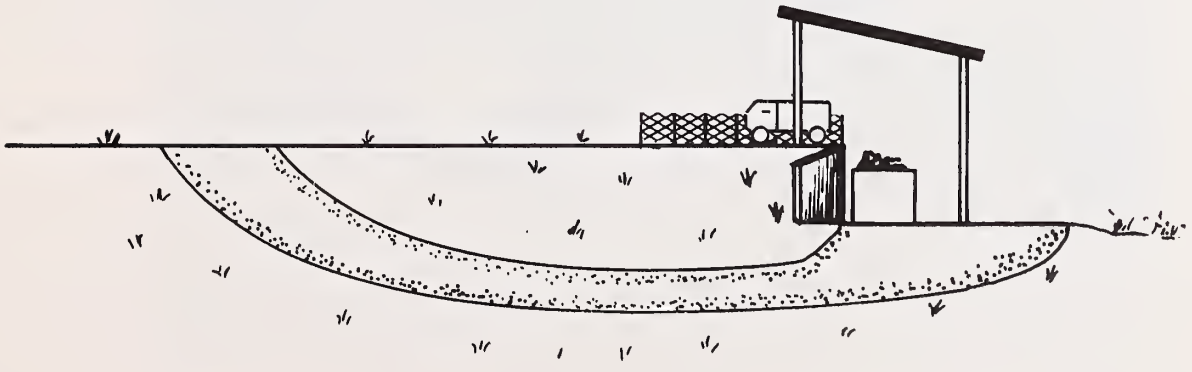
(4) Other Applicable Facility Costs

In addition to the facility costs depicted above, the alternative of transferring wastes to another landfill would incur additional costs including transportation costs of the transfer vehicle and a "drop charge" or user fee for the use of another city's or county's landfill. The transportation and drop charges associated with these transfer alternatives are included and evaluated in the "Annual System Cost Analysis", which is summarized at the conclusion of this chapter.

Roll-Off Container Site



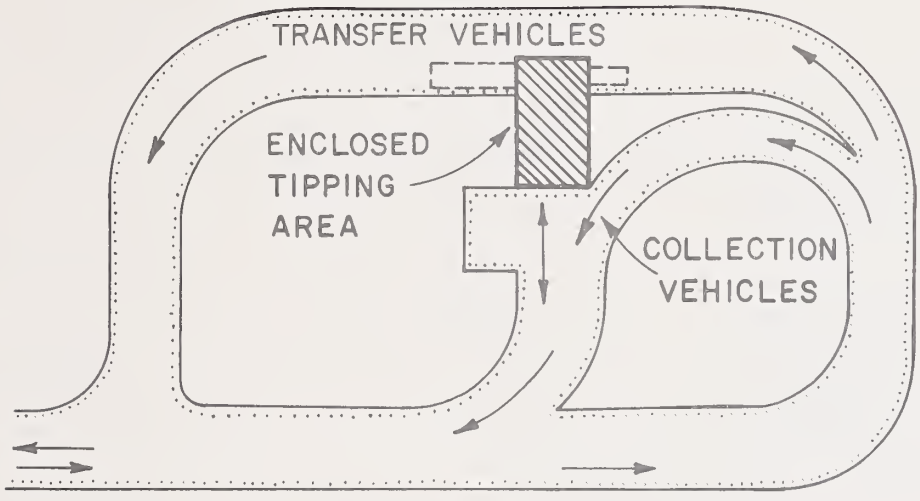
Site Layout



Site Profile View

Figure III-3

Transfer Station Layout



Site Layout

Typical Transfer Station Facility

Figure III-4

TABLE III-5

65-CUBIC-YARD COMPACTED TRANSFER STATION
COST SUMMARY

CAPITAL COSTS

Item	Units	Unit Cost	Total Cost
Land	3 ac.	$3,000/ac.	$ 9,000
Site & Fencing	L.S.	–	30,000
Building	1,000 sq. ft.	$60/sq. ft.	60,000
Trailer with Compactor	1	$48,000	48,000
Bobcat	1	$10,000	10,000
Subtotal:			157,000
Engineering, Legal & Contingency (25%)			39,000
TOTAL CAPITAL COST:			$196,000

ANNUAL COSTS
(148 days/yr.)

Item	Units	Unit Cost	Total Cost
Site Maintenance & Utilities	L.S.	–	$1,000
Compactor Operation & Maintenance	883 Tons	$1.10/Ton	970
Labor	296 hrs.[1]	$6/hr.	1,780
Bobcat Operation	L.S.	–	500
Insurance	L.S.	–	500
Subtotal:			4,750
Amortization of Capital (12% - 20 yrs.)			26,250
TOTAL ANNUAL COST:			$31,000

[1] Represents two hours for each day the site is open

For the Green Box Container System and the Transfer Station System, it would also be required to locate a local disposal site to dispose of large objects and inert materials that cannot be handled through these respective systems. A local disposal site would not, however, be required to dispose of these types of waste separately for the Roll-Off Container System, since the containers utilized for this alternative have large enough openings and sufficient capacity to accommodate almost all types of material that may require disposal.

According to state regulations, a waste disposal site that accepts only large debris and inert materials is categorized as a Class III landfill. Unlike conventional landfills which require daily cover, Class III landfills require only periodic maintenance. In addition, due to the lessened potential for environmental and health hazards (pollution of groundwater and rodent problems) and the generation of nuisance factors such as blowing paper, odors and general aesthetic degradation, less stringent standards exist for the location of Class III landfills. Based on these criteria, it is obvious that the operation of a Class III landfill is less expensive than a conventional landfill operation. The cost to operate a Class III landfill to dispose of the inert materials in conjunction with the Green Box Container System and Transfer Station System alternatives is summarized in Table III-6.

(c) Waste Incineration with Heat Recovery

Because of the increasing costs of fuel in the nation, alternative fuel sources are currently being developed and evaluated. Solid waste is receiving increasing consideration in this regard because it is available in substantial quantities and can be prepared for use as a fuel. One of the primary considerations in utilizing solid waste as an energy source is to locate or develop energy markets which fit other problem constraints. Those constraints are primarily: 1) the market must have an adequate fuel demand to make it economically worthwhile to install the necessary receiving and firing equipment; and 2) the market must have an agreeable attitude toward the utilization and pricing of a new energy source.

Through modern technology the utilization of solid waste as an energy source can be accomplished by three basic methods: 1) the use of solid waste as a primary fuel source to generate steam; 2) the use of processed solid waste as a supplement fuel in combination with other fossil fuels; and 3) the use of gases derived from pyrolyzing solid waste. After a thorough review of the waste incineration and heat recovery systems in operation throughout the nation, it was determined that a modular incineration facility would be most applicable for the Seeley Lake Refuse District. These types of systems do not require a high degree of initial waste processing, nor do they require large quantities of waste to be economically feasible. These systems are normally supplied in modules with current installations ranging in capacity from 10 to 250 tons per day.

The modular incineration facility was initially developed in the 1960's. Since that time, major modifications have been made. The systems that have been installed within the past few years have added heat recovery units and automatic ash removal systems. Basically, modular incineration systems consist of a primary combustion chamber, a secondary combustion chamber, and a heat exchanger. The units are fed by a mechanical or hydraulic ram that charges the material onto a fixed bed. The waste is ignited by use of an auxiliary fuel until temperatures allow self-sustaining combustion. Combustion in the primary chamber is usually in a starved air atmosphere. An advantage of this is that a high particular exhaust is not generated. The combustible gases generated in the primary chamber are completely combusted in the secondary chamber with the aid of auxiliary fuel. The hot gases are then passed through a fire tube or water tube boiler for heat exchange.

The facility considered for this project would consist of a single building that would house the tipping floor and the energy recovery equipment. At the facility, solid waste would be dumped directly onto the tipping floor. The waste would then be moved, stacked and placed into the 10 ton per day incinerator unit by a diesel-operated wheel loader. The refuse would then be charged by a ram into the incinerator unit, where it would be burned. The ash would be conveyed or dumped into containers located in the building. Finally, the ash would be hauled to a Class III landfill, which would have to be established. The costs for this incineration facility are shown in Table III-7.

As indicated in Table III-1, there are approximately 883 tons of waste generated annually in the Refuse District. Based on an average heating value of 5,000 Btu's per pound for solid waste, it is estimated that the 883 tons of waste could produce approximately 8,800 million Btu's annually. This represents the energy equivalence of approximately 8.8 million cubic feet of natural gas annually. In regard to the generation of steam, it is estimated that the energy available from the same waste quantity would generate approximately 3.5 million pounds of steam annually, based on a generation of 125 psi steam at a 40 percent efficiency. Also, the same energy could produce approximately 225,000 kwh of electricity.

C. ANNUAL SYSTEM COST ANALYSIS

1. General

The primary purpose of this section of the report is to evaluate and compare the annual system cost for each of the specific solid waste handling alternatives that were determined applicable for the study area. As previously discussed in this chapter, there were three basic waste handling alternatives that were determined applicable and thus were evaluated in-depth. These included: 1) sanitary landfill; 2) use of transfer systems; and 3) incineration with heat recovery.

TABLE III-7

WASTE INCINERATION FACILITY
WITH HEAT RECOVERY
COST SUMMARY

CAPITAL COST

Item	Units	Unit Cost	Total Cost
Land	5 ac.	$3,000/ac.	$ 15,000
Sitework & Fencing	L.S.	–	35,000
Building	2,500 sq. ft.	$60/sq. ft.	150,000
Utilities	L.S.	–	15,000
Incineration Modules	1-10TPD	$300,000	300,000
Bobcat	1	$10,000	10,000
Used Forklift	1	$5,000	5,000
Used Dumptruck	1	$5,000	5,000
Contingency	L.S.	25%	135,000
TOTAL CAPITAL COST:			$670,000

ANNUAL COST
(150 days/yr.)

Item	Units	Unit Cost	Total Cost
Site Maintenance & Utilities	L.S.	–	$ 3,000
Equipment Operation	L.S.	10% of capital	30,000
Rolling Stock	L.S.	–	1,000
Fuel Gas	883 Tons	$1.10/Ton	1,000
Labor	300 man-days	$85/m.d.	26,000
Spare Parts	L.S.	–	3,000
Insurance	L.S.	–	2,000
Subtotal:			66,000
Amortization of Capital (12% - 15 yrs.)			98,000
TOTAL ANNUAL COST:			$164,000

For the basic alternatives that were identified as being applicable and thus warranting an in-depth analysis, specific disposal options were initially identified. Detailed studies and subsequent annual costs were then calculated for each option. Finally, the various cost components were individually added to determine each option's total system cost. These system costs were then compared with one another as well as with the current waste disposal costs so that the District officials and concerned citizens could make general conclusions and subsequently make recommendations as to the most economical and practical waste disposal alternative for the county.

2. System Cost Components

For each specific solid waste handling option that was evaluated, it was determined that three basic cost components were applicable. These cost components included: 1) the individual facility capital and annual costs; 2) the disposal costs associated with operating the necessary disposal sites; and 3) the transportation costs associated with hauling the wastes from the various waste handling facilities to the final disposal site(s). Included herein is a brief discussion of each.

(a) Waste Handling and Final Disposal Facility Costs

The costs associated with the construction and operation of the various waste handling facilities as well as the final disposal sites for each alternative were described and calculated in detail in Section B of this chapter. Thus, for each specific alternative that was evaluated herein, the waste handling and disposal costs included in Section B were utilized.

(b) Transportation Costs

When evaluating the transportation costs of solid waste disposal systems, there are two types of haul that warrant consideration. These are: 1) primary haul, which represents the cost of transporting waste directly from the point of generation to either a rural container site, transfer station, processing plant or ultimate disposal facility; and 2) secondary haul, which represents the cost of transporting waste from one facility to another.

In most instances the primary hauling of solid waste is associated with the use of vehicles which initially collect or transport the waste. For wastes generated in urban areas, a packer-type collection vehicle is most generally used. For wastes generated in rural areas, the primary haul is usually associated with individuals transporting their wastes to either a disposal site or container site utilizing their own vehicles. When analyzing the secondary hauling of wastes, vehicles specifically designed to transport large quantities over long

distances are utilized. These vehicles usually include flatbeds, large transfer trailers, or compaction trucks.

It is the intent of the scope of services for this project to specifically determine and include in the system cost analysis only the secondary haul costs associated with each alternative evaluated. The reasoning behind not including specific primary haul costs in the system is two-fold: 1) the intent of the project is to determine the most cost-effective method to dispose of the wastes generated in the district, which excludes door-to-door collection and individual transportation of wastes from each home or business to a central disposal site; and 2) it would be impossible to estimate the cost for each individual within the study area to transport his or her own wastes to the various disposal sites which were evaluated.

In regard to estimating the secondary haul costs associated with each alternative that was evaluated for the study area, unit haul costs were developed for three vehicle types. The sources of information used to derive the unit costs were: 1) equipment manufacturers and suppliers; 2) operating records from city, county and private firms presently operating solid waste collection, transportation and/or disposal services; and 3) an analysis of present labor rates and fuel prices throughout the study area.

Table III-8 summarizes the unit costs for the vehicles that were deemed necessary to transport the wastes for the solid waste handling systems determined applicable and thus warranting analysis. As depicted in the table, unit costs for each of three types of vehicles were estimated for two gas prices – $1.30 and $2.00 per gallon. By calculating these variable transportation unit costs, the sensitivity of the annual system cost to rising fuel prices can be identified. It should be noted that no labor costs are included in these costs. The labor costs to operate the various types of vehicles were calculated separately for each option. It should also be noted that the costs depicted in the table represent costs as of January, 1981 with no inflationary factors added. Also, it was assumed that the vehicles would be owned and operated by a non-taxable entity. Thus no overhead, taxes and profit were added to these vehicle costs.

3. System Cost Analysis Summary

Included in the following narrative is a summary of the annual system cost analyses that were conducted for the specific disposal options determined potentially applicable for the study area. The estimated annual system cost for each alternative is summarized in Table III-9. As depicted in the table, the system costs are broken down by cost component for each alternative

TABLE III-8

TRANSPORTATION UNIT COSTS

I. DEPRECIATION

	Vehicle Type	New Price	Less Salvage Value[1]	Est. Mileage	Cost Per Mile
1.	20 c.y. Packer	$55,000	$8,000	100,000	$0.47
2.	Tilt-Frame	65,000	10,000	150,000	$0.37
3.	Transfer Trailer	80,000	12,000	200,000	$0.34

[1] Represents 15% of capital cost

II. OPERATION & MAINTENANCE (Cost per Mile)

		Current Fuel Prices				Escalated Fuel Prices			
	Vehicle Type	Fuel[1]	Oil & Lube	Other	Total	Fuel[2]	Oil & Lube	Other	Total
1.	Packer	.37	.07	.40	.84	.57	.10	.40	$1.07
2.	Tilt-Frame	.26	.06	.37	.69	.40	.08	.37	$.85
3.	Transfer Trailer	.52	.08	.60	1.20	.80	.11	.60	$1.51

[1] Based on $1.30/gallon (diesel)

[2] Based on $2.00/gallon (diesel)

III. TOTAL COST (Cost per Mile)

				Op. & Maint.		Total	
	Vehicle Type	Ins.	Depr.	Current	Escalated	Current	Escalated
1.	Packer	.08	0.47	0.84	1.07	$1.39	$1.62
2.	Tilt-Frame	.07	0.37	0.69	0.85	1.13	1.29
3.	Transfer Trailer	.12	0.34	1.20	1.51	1.66	1.97

evaluated. The detailed cost breakdown for the handling facility and disposal facility cost components are included in Section B of this chapter. The estimated transportation cost components for each alternative were calculated according to the information contained in Tables III-10 and III-11.

In addition to the total annual system cost, the estimated annual cost per equivalent residential unit for each alternative was determined. The total number of equivalent units was determined by dividing the estimated average quantity of waste generated by each residential unit by the total quantity of waste generated in the study area. As a result of these calculations, it was determined that the number of units summarized below is appropriate for the analysis conducted herein.

	Estimated Solid Waste Quantities		Estimated Number of Equivalent Residential Units [1]	
Generation Source	1980	2000	1980	2000
Permanent Residents	726	1,571	798	1,726
Seasonal Residents	157	298	173	327
Total:	883	1,869	971	2,053

1 Based on .91 tons of waste per equivalent residential unit

(a) District Sanitary Landfill

This alternative includes the location and proper operation of a sanitary landfill located within the Refuse District. The site would be open four days per week during the summer months and two days per week during the remainder of the year. The annual costs to own and operate the landfill site are estimated to be $34,730 per year, which represents an equivalent residential unit cost of $35.76 per year. In addition to the associated annual operational costs of the landfill, the indicated annual cost includes the amortization of $72,000 of capital expenditures required to locate and develop a new landfill site.

(b) Transfer Systems

For each of the three transfer systems determined applicable and thus warranting an

in-depth analysis, it was assumed that the transfer site would be located in the Seeley Lake area. It is estimated that one to two acres would be required to locate the necessary facilities for the various alternatives, with the Green Box System requiring the least amount of land (one acre) and the transfer station requiring the most (2.2 acres).

For each alternative, it was determined to be most economical for the wastes deposited at the transfer site to be transported to the privately operated sanitary landfill located in Missoula. The estimated transportation costs for hauling these wastes to Missoula for each alternative are summarized in Tables III-10 and III-11. For the analysis, it was assumed that a "drop charge" of $5.50 per ton would be paid by the District to the landfill owner for the use of the disposal site. As indicated in Section B of this chapter, it would also be required to locate a Class III landfill near Seeley Lake for the Green Box and Transfer Station alternatives to dispose of the inert and large bulky materials, since these systems do not have the capability to handle these wastes.

As indicated in Table III-9, the annual system cost for the three transfer alternatives varies from $44,620 to $53,500 per year, with the least-cost alternative being the Green Box System. As further indicated in the table, the cost of these transfer alternatives are approximately 30 to 35 percent higher than the alternative of locating a sanitary landfill in the Seeley Lake area.

(c) Incineration with Heat Recovery

This waste handling alternative includes the construction of a solid waste incineration facility whereby the wastes generated in the area would be burned in a modular incinerator unit capable of burning ten tons of waste per day. The facility would have the equipment capable of extracting the steam from the combustion of the waste. The steam could then either be marketed to a local energy user or be utilized to generate electricity which could in turn be marketed. For this alternative, a Class III landfill would have to be located in the area for the disposal of demolition debris along with the resultant ash and residue generated by the incineration process.

The annual system cost for this alternative is depicted in Table III-9. As indicated in this table, the annual system cost for this alternative is $123,500. This represents a 355 percent increase in annual fees compared to the cost of operating a landfill. It should be noted, however, that the annual cost depicted in Table III-9 does not include any revenue associated with the generation of steam from the incineration of the wastes. As discussed in a previous section of this chapter, the wastes currently being generated in the Seeley Lake Refuse District have a heating value of approximately 8.8 million Btu's. This heat has the capability to produce approximately 3.5 million pounds of steam per year, or 225,000 kwy of electricity.

TABLE III-9

SEELEY LAKE REFUSE DISTRICT
ALTERNATIVES ANALYSIS SUMMARY
(Annual System Costs)

Cost Component	ALTERNATIVE				
		Transfer Systems			
	District Sanitary Landfill	Green Box System	Roll-Off System	Transfer Station	Modular Incineration
1. Facility or Container Costs	—	$2,830	$3,280	$31,000	$119,000
2. Disposal Costs					
a) Local Landfill	$34,730	$4,500	—	$4,500	$4,500
b) Drop Charge	—	$4,420	$4,860	$4,420	—
3. Secondary Transportation Costs[1]					
a) Vehicle Depreciation, Operation, & Maintenance	—	$24,770	$30,200	$11,140	—
b) Labor	—	$8,100	$9,720	$2,440	—
Total Annual Cost:	$34,730	$44,620	$48,060	$53,500	$123,500
Cost per Unit per Year[2]	$35.76	$45.95	$49.50	$55.10	$127.19

[1] Based on current fuel prices

[2] Based on 971 equivalent units

TABLE III-10

TRANSPORTATION COST SUMMARY

Alternative	Miles/Trip	Trips/Year	Miles/Year	Cost/Mile		Cost/Year	
				Current	Escalated	Current	Escalated
1. Packer Truck to Missoula							
a) Current Wastes	110	162	17,820	1.39	1.62	24,770	28,870
b) Future Wastes	110	340	37,400	1.39	1.62	51,990	60,590
2. 40-cubic-yard to Missoula							
a) Current Wastes	110	243	26,730	1.13	1.29	30,200	34,480
b) Future Wastes	110	510	56,100	1.13	1.29	63,400	72,370
3. 65-cubic-yard to Missoula							
a) Current Wastes	110	61	6,710	1.66	1.97	11,140	13,220
b) Future Wastes	110	128	14,080	1.66	1.97	23,370	27,740

TABLE III-11

TRANSPORTATION LABOR COST SUMMARY

Alternative	Trips/Year	Hrs./Trip	Cost/Hr.	Cost/Yr.
1. Packer Truck to Missoula				
a) Current Wastes	162	4	$10.00	$ 6,480
b) Future Wastes	340	4	$10.00	13,600
2. 4-cubic-yard to Missoula				
a) Current Wastes	162	5	$10.00	8,100
b) Future Wastes	340	5	$10.00	17,000
3. 40-cubic-yard to Missoula				
a) Current Wastes	243	4	$10.00	9,720
b) Future Wastes	510	4	$10.00	20,400
4. 65-cubic-yard to Missoula				
a) Current Wastes	61	4	$10.00	2,440
b) Future Wastes	128	4	$10.00	5,120

Since the annual costs that are indicated in Table III-9 for this alternative are extremely high, it is quite apparent that revenues from the sale of the energy generated from the incineration of the wastes must be obtained in order to make this option economical. During the progress of this study, the Consultant attempted to identify potential energy markets for this waste-derived energy. As a result of these investigations, it was determined that only two potential market situations exist. These are the Seeley Lake High School and the Pyramid Mountain Lumber Company. After thoroughly reviewing the demands and delivery conditions of the energy consumed at these two facilities, it was determined that it would not be practical or economical to utilize solid waste-derived energy sources for these two situations for the following reasons:

1. The total energy consumption of the high school is less than ten percent of the available energy from the wastes generated in the area. Thus there would not be sufficient revenues generated to offset the capital and annual costs of the incinerator facility.
2. Currently, the Pyramid Mountain Lumber Company's fuel costs to operate their plant are minimal since the facility utilizes its waste wood materials for generating the facility's steam requirements. Based on this situation, the Pyramid Mountain Lumber Company has indicated that they would not be interested from an economic standpoint in purchasing energy from a waste-to-energy incineration facility.

One other alternative that was investigated for utilizing solid waste as an energy source was the generation of electricity from the steam produced by a modular incineration facility. As previously indicated, the available solid waste in the area could generate approximately 225,000 kwh of electricity annually. If this electricity could be marketed for $.04/kwh, the revenue associated with this situation would equal approximately $9,000 annually. In reviewing this revenue with the annual costs associated with constructing and operating a modular incineration facility ($123,500 annually), it is apparent that the revenue associated with the sale of electricity would give little assistance in reducing the total annual system cost of this waste-to-energy alternative when this cost is compared to the annual system cost of the other waste handling alternatives investigated. Based on these analyses, it can be concluded that a modular incineration facility cannot be considered a feasible waste disposal alternative for the study area at this time.

D. SENSITIVITY ANALYSIS

Due to the rising cost of fuel and the increased population growth in the study area in recent years, sensitivity analyses were conducted to determine the impacts these two factors would have

on the annual system costs of the various waste disposal, transfer and recovery alternatives that have been previously discussed in this chapter. Summaries of these two sensitivity analyses are graphically depicted in Figures III-5 and III-6. Included in the following paragraphs is a brief synopsis of the conclusions of each analysis.

1. Sensitivity to Increased Fuel Prices

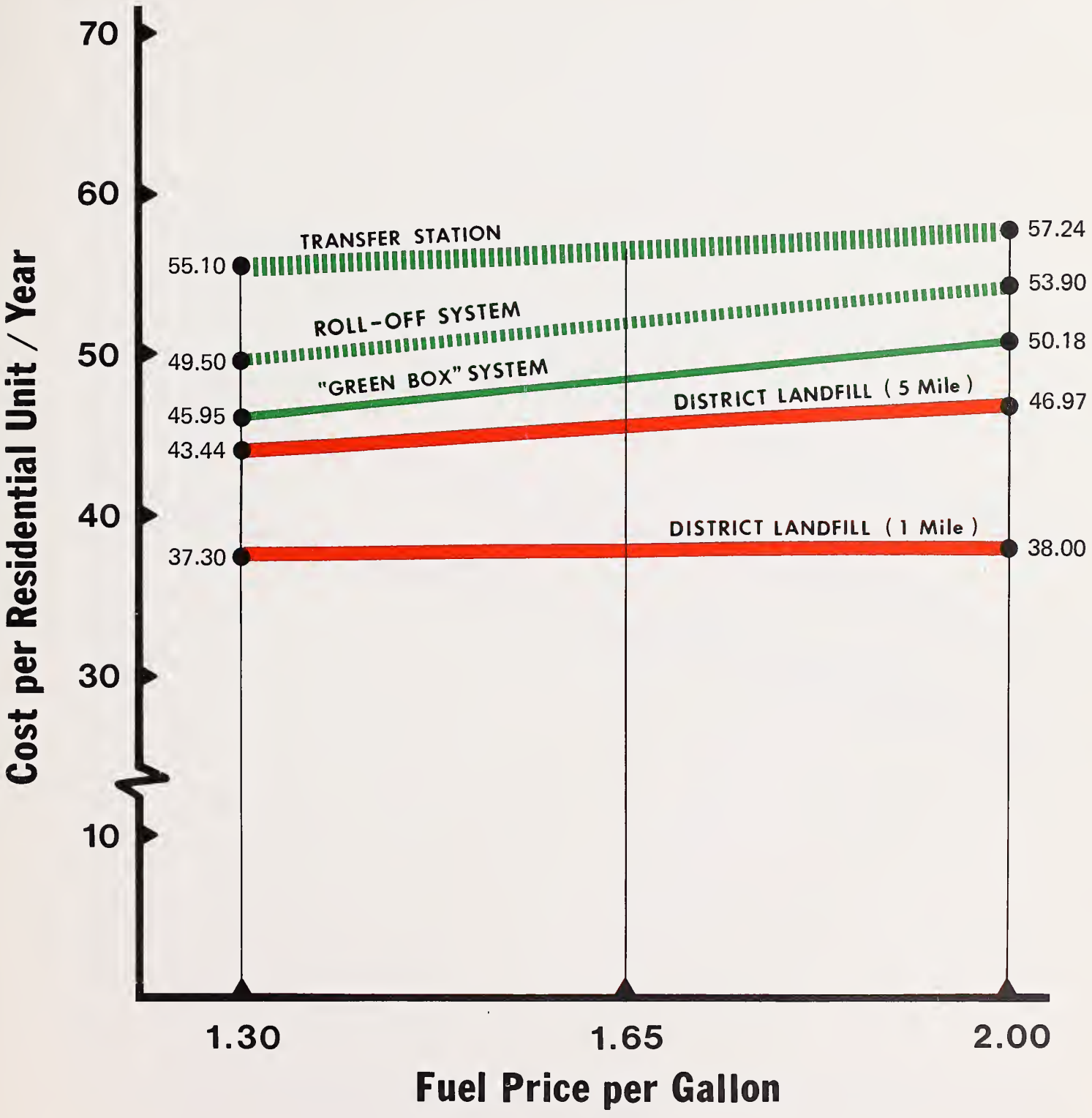
For this analysis, the annual system cost of the various alternatives was calculated based on fuel prices of $1.30 and $2.00 per gallon. For the district landfill alternative, estimated transportation costs that would be incurred by individuals to transport the waste from the centroid of the waste generation in the District (Seeley Lake) to a hypothetical district landfill site located either one mile or fives miles from the centroid were added to the capital and annual landfilling costs as depicted in Table III-2.

As indicated in Figure III-5, it is apparent that the impact on the total system cost of the various alternatives is not significant. In most cases, a fuel price increase from $1.30 to $2.00 per gallon would represent less than a 15 percent increase in the total system cost. The highest impact would occur for the Green Box and Roll-Off Container Systems while the least impact would occur for the district landfill and transfer station alternatives. In all cases, a substantial fuel price increase would not change the ranking of the alternatives with regard to annual costs.

2. Sensitivity to Increased Waste Quantities

For this analysis, the annual system costs of the various alternatives were calculated, based on current waste quantities generated in the study area (883 tons) and on the projected waste quantities generated in the year 2000 (1,870 tons). As indicated in Figure III-6, the alternatives that are quite capital-intensive (district landfill and transfer station) are substantially more sensitive to the increased quantities of solid waste that must be disposed of, compared to the two container system alternatives that are less capital-intensive. As indicated in the figure, the annual system cost per residential unit could be reduced by approximately 40 percent for the district landfill and transfer station alternatives, while the annual unit costs for the container systems would be reduced by less than ten percent if the quantities of waste generated in the area were increased substantially.

Sensitivity of Increased Fuel Prices



NOTE: Based on Current Waste Generation of 883 Tons per Year

Figure III-5

PART FOUR

RECYCLING FEASIBILITY ANALYSIS

PART FOUR

RECYCLING FEASIBILITY ANALYSIS

A. GENERAL

The primary objective of this section of the study is to identify and evaluate existing and potential markets for recoverable materials in the solid waste generated in the study area. The information obtained from this investigation will be used to determine the potential of implementing recycling and/or resource recovery strategies within the area of study. The potential for implementing a solid waste recycling program is directly dependent upon markets for the recoverable materials. Revenue from the recoverable materials must be obtained to offset the costs of collecting and separating the wastes in most cases. If revenues for the recoverable materials cannot be obtained, other methods of disposal will be more economical.

Historically and at the present time, the markets for recoverable materials have shown significant fluctuation. The fluctuations may be attributed to a number of outside forces. Among these are: 1) supply and demand for specific materials; 2) strikes in virgin material industries; 3) governmental influences through tax or price incentives; 4) foreign purchases; and 5) transportation costs. In general, markets for recoverable materials have shown an upward trend similar to that of most other commodities. Although future prices are extremely difficult or impossible to predict, it would be reasonable to expect this trend to continue. In addition to the economic factors, environmental, technological, political and sociological forces are emphasizing recycling programs as a desirable and practical alternative to conventional solid waste disposal. The extreme fluctuations in price and quantities are lessened in magnitude and frequency as the market for recoverable materials increases. When prices are adequate enough to make recycling attractive, many individual waste generators practice recycling. When the market drops below a certain economic level, these recycling materials become solid waste.

B. TYPES AND QUANTITIES OF RECOVERABLE MATERIALS

An important factor that must be determined prior to the evaluation of the feasibility of recycling solid wastes is the quantity and composition of wastes generated in the study area. Generally there are two types of recoverable materials found in solid wastes: 1) secondary materials that can be reused, such as newsprint, corrugated and glass; and 2) those materials which can be used as a

fuel source to generate steam, electricity and/or heat. The analysis included in this chapter summarizes the feasibility of recovering those secondary materials generated in the area. The analysis evaluating the feasibility of utilizing solid waste as an energy source has been included in another chapter.

A detailed investigation of the quantity of solid waste was conducted in Part Two of this report, and quantities of waste were derived by applying typical waste generation rates to the estimated number of residents in the study area for the current year and the year 2000. Through analysis of the detailed solid waste quantity and composition investigations conducted for the State of Montana during the State Solid Waste Management and Resource Recovery Study in 1976, it was possible to obtain composition data for the wastes generated in the area. During this study, solid waste samples were taken from several areas of the state. For each sample, the various constituents found in the wastes were weighed. Based on the sampling program, average composition data for the wastes generated in the state were developed.

In most instances, the recoverable secondary materials that are practical to recycle are limited to ferrous and non-ferrous metals, separated newsprint and corrugated, and glass. In some instances, other materials such as clothing, rubber and wood products are economically recoverable. However, these instances are uncommon and will not be investigated to a great degree in this study.

The estimated quantities of recoverable secondary materials generated in the study area are depicted in Table IV-1. The quantities of materials depicted are based on the waste generation information developed in Part Two of this report and the waste composition data that was determined applicable from the state-wide solid waste study conducted in 1976. As the table indicates, approximately 52 and 9 tons of recoverable ferrous and non-ferrous metals, respectively, are generated in the Refuse District annually. Also, 166 and 68 tons of paper and corrugated, respectively, are generated and potentially recoverable annually. If market conditions are favorable, it is anticipated that a majority of this material could be recovered economically and effectively.

C. MARKET ANALYSIS FOR SECONDARY MATERIALS

A review of potential buyers for materials that may be recovered from the Refuse District's solid waste indicates that real markets presently exist for many products. Before some materials gain acceptance and are in demand in the marketplace, however, new developments must occur within the industry to make these commodities attractive. In most cases, the recovered materials must meet strict specifications set down by industry in order to command the highest market price. In all cases, a recycling program should be designed to be flexible enough so that if one market

TABLE IV - 1

SUMMARY OF TOTAL WASTE COMPOSITION
FOR
SEELEY LAKE REFUSE DISTRICT

(Tons Per Year)

Characteristic	Average %[1]	Estimated Current Quantity	Year 2000 Projected Quantity
Combustibles:			
Paper	18.8	166	351
Cardboard	7.7	68	144
Other	31.7	280	593
Subtotal	58.2	514	1,088
Non-Combustibles:			
Ferrous	5.9	52	110
Non-Ferrous	1.0	9	19
Glass	4.3	38	80
Other	30.6	270	572
Subtotal	41.8	369	781
TOTAL:	100%	883	1,869

1 Source: "Population, Employment and Waste Generation Report" prepared for the State of Montana Department of Health and Environmental Sciences, 1976.

slows down or fails, any single unit process for a commodity can be discontinued or shifted to another market without disrupting the future of the program. During such a slowdown, it would be useless for the program to continue to recover that product if no other market was available. In some situations it may also be profitable to stockpile the material awaiting a favorable change in market conditions rather than to discontinue collection of the materials.

The basic objective of the product identification and marketing portion of this study was to identify the various potential buyers who exist for the products which could conceivably be separated from solid wastes within the Seeley Lake Refuse District. It is apparent that a large array of products could possibly be recovered from the solid waste generated in the area. In order to explore the market potential of the alternative products more efficiently, these products were grouped into several major categories: 1) ferrous metals; 2) non-ferrous metals; 3) glass; and 4) paper products. The first phase of the task in this project was to identify the major processes used in the recovery of the material and the uses the material may serve. Then local markets, other Montana markets and national or regional markets were addressed for each of the major categories.

1. Recovery Processes

(a) Ferrous Metals

Basically, there are two processes for the recovery of ferrous materials from solid wastes: chemical processing and remelting. Chemical processing is intended to extract primarily tin and copper from ferrous materials. Detinning is an industrial process which recovers tin from tin-plated steel cans, and which generally yields about seven pounds of tin from each ton of scrap cans. Copper precipitation involves the leaching out of copper from reclaimed steel cans; presently, this process is one of the few economically feasible methods of recovering copper from low-grade materials.

In addition, steel scrap may be remelted in steel furnaces and iron foundries and used to product new steel products. The main source of remelting material, steel cans, may not be a desirable raw material due to the low density of the scrap and the non-ferrous contaminants. Other ferrous scrap such as white goods, appliances, automobiles, and similar materials are denser and are better suited for the remelting process. Steel can scrap may also be used to produce ferro-alloys when the iron is combined with controlled quantities of other elements. The resulting material is then used as an additive in melts for alloy steel and castings.

(b) Non-Ferrous Metals

Although non-ferrous metals, comprised primarily of aluminum, represent less than

one percent of the municipal solid waste, once separated these materials become extremely valuable and numerous markets exist.

After the general metal waste has been shredded and ferrous metals have been magnetically removed, two processes are generally used to isolate the aluminum fraction of the resultant material. The first procedure employs chemicals which are directly added to a suspension in which the aluminum is sitting. Recoverable aluminum, comprised of numerous aluminum alloys and other light metals, will separate itself by collecting on the surface. The aluminum isolated in this way can be marketed; however, the quality of the material is reflected in low market prices. The aluminum fraction found primarily in beverage cans may be isolated by eddy current separation, a process that essentially uses aluminum magnets to attract recoverable aluminum. This material is a single alloy and has a relatively high market value. The aluminum recovered by both processes and other scrap aluminum is remelted and cast directly into ingots for use in making new cans and other products.

Mixed non-ferrous metals account for a small portion of the total non-ferrous metals that can be recovered from solid waste. This portion of the waste consists of small amounts of copper, lead, zinc, brass and other metals. Each of these metals is valuable by itself, but extensive processing is required to recover individual non-ferrous metals. Currently, the recovery of these metals by processing is not economically feasible.

(c) Glass

Certain types of glass which are contained in municipal solid waste may be recovered, remelted, and used in the manufacture of new glass products. Most glass manufacturers readily accept the scrap glass, or cullet, because its use reduces fuel consumption and aids the melting process by liquifying at lower temperatures than new materials. Color and purity requirements established by glass manufacturers limit the recovery of glass to some extent. The only reliable method of insuring the quality of the recovered glass is by manual sorting, an expensive and time-consuming process. Unsorted crushed glass scrap has been utilized in some areas as an aggregate in the production of asphalt and other building materials.

(d) Paper Products

Waste paper products may be recovered by several different methods which include: 1) direct recovery by the paper industry; 2) manual segregation of selected papers by consumers; 3) mechanical processing of municipal waste to recover fiber material; and 4) conversion to usable forms of energy by processing the paper along with other post-consumer

wastes. Recovered paper is primarily used for the manufacture of building products and for repulping. The operations that use waste papers as a raw material are extremely concerned about levels of contaminants such as plastics, metals, and oils, which have serious efffects on some manufacturing processes. It is very probable that some recycled papers could not be acceptable for uses such as food packing because of public health concerns.

In general, there are three major types of waste paper that are easily recoverable. These types include:

1) Used containers, both solid fiber and corrugated;
2) News, which includes newspapers and special types of newsprint;
3) Mixed papers, primarily mill wrappers, computer cards and printouts, book stock, and magazine papers.

2. Secondary Materials Markets

For the purposes of this report, inquiries were made to three levels of secondary materials markets: national, state, and local outlets. Several national and state industrial and trade associations were contacted and potential buyers of these materials were identified from each association's membership. As the list of potential buyers increased, specific inquiries were formulated regarding the required material specifications, the capacity each potential buyer might have for recovered materials, and the pricing structure associated with each of the potential products. Included herein is a summary of the market investigations which were conducted to determine the feasibility of recovering secondary materials from the solid wastes generated within the Refuse District.

(a) Ferrous Metal Markets

On the national level, some interest was shown by Midwestern markets in purchasing ferrous materials which could potentially be recovered from solid waste generated in the study area. Utilization of these markets is not currently profitable due to the long haul distances and the high freight and handling costs required to transport the material to the nearest plant locations.

Markets for secondary ferrous materials within Montana consist primarily of scrap metal dealers, and those contacted expressed considerable interest in purchasing recovered ferrous materials. One industry, ARCO, located in Butte, is presently operating a copper precipitation plant and utilizes substantial quantities of shredded and detinned ferrous metals in its process. Officials indicated that they could be considered a potential market for this type of ferrous material if high standards could be maintained. Local and area markets that have indicated an interest in purchasing certain types of ferrous scrap metal include:

Pacific Hide & Fur (Missoula):	Cast/Scrap Iron ($30-$40/Ton)
Pacific Iron & Metal (Kalispell):	Cast/Scrap Iron ($20-$40/Ton)
Montana Recycling (Missoula):	Steel cans ($.10/lb.)
Flathead Ind. for the Handicapped (Kalispell):	Steel cans ($.08/lb.)

(b) Non-Ferrous Metal Markets

In regard to potential markets for the recoverable non-ferrous metals generated within the study area, it was determined that definite national markets exist for these materials. Several firms from the Pacific Northwest expressed interest in these materials; however, high transportation and handling charges effectively prevent the use of the markets at this time.

Numerous state and local outlets exist for recovered non-ferrous metals, primarily because each metal is relatively valuable. Aluminum, copper, brass, and to some extent lead are most often purchased by scrap metal dealers. The price paid for each metal is dependent upon the quantity and the amount of contaminants each recovered material contains. The most favorable local and area markets are summarized as follows:

Pacific Hide & Fur (Missoula):	Aluminum (cans & scrap) $.20 - .30/lb.
	Brass (red & yellow) $.30 - .40/lb.
	Copper (No. 1 & 2) $.45 - .60/lb.
Pacific Iron & Metal (Kalispell):	Aluminum (cans & scrap) $.20 - .30/lb.
	Brass (red & yellow) $.27 - .35/lb.
	Copper (No. 1 & 2) $.45 - .55/lb.
Montana Recycling (Missoula):	Aluminum (cans & scrap) $.10 - .30/lb.
Flathead Ind. for the Handicapped (Kalispell):	Aluminum cans $.20/lb.

In many areas of the state, beverage distributors provide excellent local outlets for aluminum cans. In the Missoula area, distributors encourage individuals to use the facilities at Montana Recycling. In addition, numerous individuals in the Seeley Lake area recycle aluminum beverage cans and ultimately transport them to Missoula.

(c) Glass Markets

An investigation into the location of glass container manufacturing plants indicated that very few glass manufacturing industries are close enough to Montana to be considered potential markets. The Owens-Illinois Corporation operates two glass container plants in the Pacific Northwest which accept large quantities of recovered glass. Again, it is not feasible to utilize this market due to high transport and handling costs.

The most favorable local markets exist with the recycling centers and beverage distributors located in Missoula and Kalispell. These outlets accept only specific types of beverage bottles. The following area markets appear to be the most favorable outlets for certain types of beverage bottles:

Montana Recycling (Missoula):	Selected bottles ($.25 or .50/case)
Flathead Ind. for the Handicapped (Kalispell):	Selected bottles ($.25 or .50/case)

(d) Paper Markets

Markets for recovered waste papers, including newsprint, corrugated and other types of mixed papers are extremely favorable. Numerous outlets for these materials exist within the region and the state of Montana. Firms located in eastern Washington and in Utah both expressed a great deal of interest in purchasing recovered materials. The paper market fluctuates a great deal and at the present time it is not economical to use these regional markets because of transportation costs.

Numerous outlets for waste paper within the state of Montana may be utilized effectively. Two firms located in Great Falls use newsprint in the manufacture of cellulose fiber insulation and purchase newsprint throughout the year. Currently, the price being paid for newsprint is quite low, a reflection of the trend being experienced by the building industry. Montana Recycling, located in Missoula, accepts newsprint and other types of waste paper and provides the most favorable outlet for recovered paper. The following listing summarizes the most favorable outlets for waste paper materials potentially recoverable from waste generated within the study area:

Montana Recycling (Missoula):	Newsprint & Ledger ($0.01/lb.)
	Computer Cards ($0.05/lb.)
	Computer Printout ($0.04/lb.)
	Corrugated - not accepted at this time
Robinson Insulation (Great Falls):	Newsprint ($20/Ton)
Allweather Insulation (Great Falls):	Newsprint ($20/Ton)

Market prices for newsprint and corrugated papers increase significantly if large quantities of clean materials are available and if the density of the waste paper is increased by baling. In most cases, the material must be delivered to the plant location.

D. SUMMARY OF RECYCLING FEASIBILITY

Included in the following statements is a summary of the potential for economically recovering and marketing secondary materials found in the study area's solid waste stream.

1. Ferrous Metals

In general, the small quantities of recoverable ferrous materials generated within the study area and the long distances between the study area and Midwestern consumers prohibit the utilization of these regional markets at this time.

It appears that the most feasible markets for ferrous materials recovered from the solid waste generated within the study area exists with scrap metal dealers within the state. A number of area scrap dealers have expressed interest in obtaining the quantities of ferrous materials that may be recovered from a recycling program operating within the study area. Prices paid for the ferrous scrap are dependent upon the quantity and quality of the material.

2. Non-Ferrous Metals

Regional markets for non-ferrous metals exist in the Midwest and on the West Coast; however, the high transportation costs associated with shipping non-ferrous metals from the study area to these regional markets make their utilization not economically feasible at this time.

However, numerous state and local markets exist for non-ferrous materials generated within the study area, primarily because of the value of many of these metals. The favorable price structures of the non-ferrous metals markets provide the largest incentive for basing a recycling program on the recovery of these metals.

3. Glass

Currently, the potential for the recovery of most types of waste glass is relatively low. Outlets do exist on the state and local levels for specific types of beverage glass, and these outlets should be utilized to the maximum extent possible. Utilization of markets in the Pacific Northwest is not feasible at this time due to excessive transportation and handling costs.

4. Paper Products

Although national and regional markets do exist for some paper products, it appears more feasible to utilize the markets within the state. As previously mentioned, several operations within Montana utilize newsprint in the manufacture of cellulose fiber insulation. These materials should continue to be utilized as much as possible. Prices on the paper market are extremely variable; however, sufficient outlets exist within the state to purchase many types of paper products during all market conditions.

PART FIVE

ANALYSIS OF SPECIAL WASTES

PART FIVE

ANALYSIS OF SPECIAL WASTES

A. GENERAL

The quantity and composition of solid waste varies considerably around the State of Montana and within the study area. Although various portions of the study area generate different types and quantities of solid waste, the conventional portion (residential and commercial) of the total waste generated has similar composition characteristics and is generated in about the same per capita quantities throughout the study area and the state. These wastes are estimated to comprise approximately 90 percent of the total waste generated. It is the remaining ten percent of the wastes which vary the most in composition from area to area. These "special" wastes are responsible for many of the solid waste management problems generally experienced, because most require special handling and disposal. It should be emphasized that regardless of the waste handling alternative that is implemented, provisions and/or handling facilities must be made available for the remaining special wastes which are compatible with the selected solid waste management system.

In order to determine the proper disposal method for these "special" wastes, it is first necessary to classify them according to waste type. During May, 1980 the federal government through the Environmental Protection Agency (EPA) published waste classification, handling and disposal guidelines which categorized solid waste into hazardous and non-hazardous wastes. The State of Montana generally classifies wastes according to the guidelines established by the EPA. Under the current State regulations, all wastes categorized by the EPA as hazardous are considered Group I wastes by the State and must be disposed of at a Class I disposal site. The State further classifies all decomposable wastes, excluding hazardous wastes, as Group II, and requires that these wastes be disposed of at a conventional sanitary landfill (Class II site). According to state regulations, all other materials such as construction debris, wood wastes and inert materials are classified as Group III materials and can be disposed of in a Class III disposal site (demolition and fill site).

Included in the following section of this report is a brief evaluation of the existing disposal regulations and practices, and suggestions for the proper disposal of numerous "special" wastes generated within the study area. Obviously, there are other types of wastes produced within the study area that present occasional problems to local officials and residents; however, in most instances these problems may be solved on a case-by-case basis and do not warrant extensive analysis at this time. The following narrative contains a brief summary of the information obtained and the recommendations for handling and disposal that were formulated for each type of waste analyzed.

B. ANALYSIS OF INDIVIDUAL WASTE TYPES

1. Septic Tank Pumpings and Sludges

Significant quantities of septic tank pumpings are generated within the study area each year. Septic tank systems are commonly used because municipal treatment facilities are not available in many smaller communities or rural areas. The treatment of municipal sewage and industrial wastewaters is responsible for the formation of most sludges. Handling and disposal of sludge is primarily the responsibility of the waste generators.

According to the current EPA guidelines, septic tank pumpings are considered to be non-hazardous and may be deposited in a conventional sanitary land fill (Class II landfill). Municipal sewage sludge and non-hazardous industrial sludges may be disposed of in a similar fashion, providing proper treatment has occurred. State of Montana regulations mandate that special use permits be obtained before these materials are disposed of at a Class II site. The operational procedures and environmental conditions of each site must be evaluated before State approval is granted.

a. General Disposal Practices

As previously mentioned, disposal of septic tank pumpings may occur at Class II landfills if State approval is granted. Currently, very few landfills within the state have obtained permission to dispose of this material. Any landfill which presently accepts such materials and does not have licensed approval is not operating in strict compliance with the law. Numerous cases of indiscriminate dumping of septic tank pumpings occur throughout the state each year. This practice is not only unlawful but also quite hazardous, due to the potential for groundwater pollution and public health problems.

Present EPA regulations prohibit the disposal of untreated municipal sludge at landfills, or by other methods of land application such as spreading, spraying or tilling. Under typical sewage treatment processes utilized today, about 95 percent of the sludge produced is water. EPA regulations require some form of sludge concentration prior to final disposal. The most common methods of sludge concentration are by: 1) the addition of chemicals; 2) evaporation in drying beds; or 3) incineration. All three processes involve the production of a conditioned sludge which may be disposed of at a licensed landfill or used as a soil conditioner on agricultural land.

Industrially generated sludges are usually handled in a similar manner; however, chemicals and mechanical processes are generally utilized to consolidate the material.

Sludges considered hazardous must be landfilled at a Class I disposal site; if the sludge is not hazardous, it may be disposed of at a Class II site. Incineration or land application of industrial sludges is generally not practiced.

b. Recommended Disposal Procedures

It is recommended that septic tank pumpings be disposed of at an existing sewage treatment facility, where the material may be integrated into the treatment process. The disposal of septic tank pumpings directly into wastewater treatment lagoons is an acceptable disposal method.

Alternate methods of septic tank pumpings disposal include: land spreading, drying in shallow evaporation ponds, and disposal at licensed landfill sites. It is recommended that sewage sludges be disposed of at either an approved landfill site or applied to agricultural land for use as a fertilizer. Non-hazardous industrial sludges should be disposed of at a licensed Class II landfill. In general, any sludge must be conditioned prior to its final disposal utilizing any of the methods previously discussed.

2. Dead Animals

a. General Disposal Practices

The number of dead animals, both domestic agricultural animals and game animals, varies throughout the year. Animal losses may occur during calving and lambing season when weather conditions are critical to many newborn animals. Hunting season also produces numerous instances of carcass abandonment. State law prohibits the placing of all or any part of a dead animal in any water body, road, street, alley, lot or field. It is also unlawful to place all or part of a dead animal within one mile of the residence of any person unless it is burned or buried at least two feet underground. Dead animals are classified as a Group II waste and may be disposed of at a Class II landfill site if special procedures are followed. However, almost every county in the state prohibits the burial of dead animals at sites within their respective counties.

Several methods of disposal currently practiced are in compliance with present State regulations. These include proper disposal on private land, disposal of the carcass at rendering plants, and disposal at Class II landfills. Each of these techniques, if properly administered, will contain and restrict any of the potentially harmful constituents of the waste.

b. Recommended Disposal Procedures

Based upon conversations with State officials and examination of State regulations, the best method of carcass removal and disposal is by a rendering operation that is licensed and meets the Montana Department of Livestock requirements for such operations. In most instances, the rendering service will provide free pickup and delivery if the number of animals and transportation distances make this economical. Currently, several rendering companies in the state provide disposal service for dead animals. The names, locations and phone numbers for each company are listed below:

NAME	LOCATION	TELEPHONE NO.
Billings Rendering Co.	Billings, MT	248-8410
Dillon Rendering Co.	Dillon, MT	683-2812
Miles City Rendering Co.	Miles City, MT	232-1956
Rocky Mountain Rendering Co.	Great Falls, MT	454-1953
Western Montana By-Products, Inc.	Missoula, MT	543-8291

The second most desirable disposal method for dead animals is by burial by individual owners on their own property. This method in most instances is the least costly due to low transportation and handling costs. A third acceptable disposal method is burial at state-approved sanitary landfills where proper handling procedures are employed and supervision is provided.

3. Bulky Materials

a. General Disposal Practices

Bulky wastes consist primarily of discarded appliances (white goods), demolition debris materials (rock, brick, concrete), and numerous types of wood wastes. According to State guidelines, these inert materials are non-water soluble and are classified as Group III wastes and may be disposed of at Class III sites. Currently, very few licensed Class III sites exist within the state; therefore, most of these materials are disposed of at Class II sites. Most landfills accept these materials and separate areas of the site are set aside for specific types of bulky items. This stockpiled material in some cases may be sold to scrap metal dealers for salvage. Other materials such as concrete, stone or dirt may be utilized as fill material. Instances of disposal in violation of State guidelines occasionally occur; the most common offenses involve the burning of the combustible fraction of the bulky materials, primarily wood wastes, or indiscriminate dumping of the materials.

b. Recommended Disposal Procedures

After examining the existing state laws regarding disposal of bulky materials, it is apparent that most of the existing disposal practices are in conformance with the laws. The recommended disposal procedures for bulky materials include: 1) proper disposal at a Class III site; 2) disposal at a licensed Class II disposal site; and 3) salvage of the usable portion of the bulky materials (use of stone, concrete or dirt for fill material is a good example).

4. Used Tires

a. General Disposal Practices

It is estimated that within the State of Montana, more than 680,000 used tires are generated each year, based upon a national average of 1.14 waste tires per registered motor vehicle per year. This represents a substantial amount of waste material which must be disposed of annually. Tire composition has changed over the years and the primary non-rubber constituents currently found in tires are woven steel belting, fiberglass belting, polyester cord, and steel bead wires. According to State laws, used vehicle tires are classified as Group III wastes and may be disposed of at Class II or Class III disposal sites.

Currently, the most common method of used tire disposal within the study area and the state consists of stockpiling or burial in sanitary landfills. Unless properly positioned in the landfills, however, the tires will eventually work up to the surface. The majority of waste tires placed in landfills are not properly buried, and periodic problems are experienced.

b. Recommended Disposal Procedures

Several alternate methods for used tire recovery and disposal have been utilized over the last few years with success in various areas of the nation. The most common fate of approximately one-third of the used tires is recapping. Numerous large companies collect used tires from local tire dealers and recap them at plants located within the state. Recapping partially solves the used tire problem; however, there are many waste tires not suitable for recapping that must receive proper disposal.

Tires may be processed before disposal in order to eliminate problems associated with handling and disposal. Processing may be accomplished by shredding, slicing or by cryogenic procedures, where materials are subjected to sudden drops in temperature and are ultimately shattered. These processes substantially reduce the volume of the tires, which in turn reduces transportation and handling problems. Processing also increases the chance

that some or all of the used tire constituents may be recovered. Currently, the processed tires may be utilized as an additive to asphalt paving material or as an energy source.

Based upon the investigations conducted for this report, it is recommended that waste tires be recycled by one of the methods previously mentioned to the highest degree possible. If recycling tires is not feasible, these materials should be disposed of at licensed sanitary landfills.

5. Scrap Automobiles

a. General Disposal Practices

A scrap automobile can be defined as a derelict, unused, inoperable automobile with little or no value. Based on national averages, it is estimated that the motor vehicle survival rate decreases from 95 percent after six years in service to less than 20 percent after fourteen years of service. During its "life cycle", a motor vehicle will pass from a transportation unit to a valuable source of spare parts for other vehicles and ultimately to a source of scrap metal to be reused by the metal industry.

According to State law, abandoned automobiles are classified as a Group II waste and may be disposed of at a Class II landfill. Due to the large amount of space required for storage of junk vehicles at disposal sites and problems encountered with the burial of automobiles, many landfills do not accept junk vehicles.

b. Recommended Disposal Procedures

It is recommended that every attempt be made to dispose of junk vehicles at a properly licensed junk vehicle wrecking facility for crushing and transport to one of the various shredding plants located in the region. The shredded vehicles may then be processed into scrap and utilized by foundries to make new steel. If it is not possible to salvage the junk vehicle, disposal should occur at a Class II landfill that accepts scrap automobiles.

c. Junk Vehicle Disposal Program

A statewide junk vehicle disposal program was implemented in July, 1973. The program is financed by several sources: 1) the sale of junk vehicles; 2) a $.50 fee levied on all vehicles registered in the state; 3) a licensing fee levied on all wrecking facilities; and 4) a title transfer fee of $1.50. Under this program, funds are provided to counties for planning programs as well as operation costs. Each county may determine the type of program it feels best suits the needs of the county residents. Assistance to each county is provided

by the State as problems arise. The program stipulates that each junk vehicle graveyard must have a minimum of two acres of land and must be properly shielded from public view. After 200 vehicles have been accumulated at each graveyard, a contract is obtained with a scrap dealer to dispose of the vehicles. The profit obtained from the sale of the junk vehicles is then placed in the state's operating budget.

At the present time, there are over 100 licensed motor vehicle wrecking facilities within the state which have removed more than 10,000 junk vehicles from the state since the program was initiated. The majority of the vehicles are crushed on-site and transported to one of the various shredding plants located in the Pacific Northwest. The shredded vehicles are then processed into scrap and ultimately transported to foundries to make new steel. The program has functioned quite effectively since its inception.

6. Hazardous Wastes

Many wastes produced by agriculture, industry, hospitals and government may be hazardous and may require special precautions during transport, hauling and disposal. The EPA estimates that within the United States, only ten percent of the hazardous waste generated annually is managed in an environmentally safe manner. The remainder is handled in a fashion which could potentially threaten human health and the environment.

The Environmental Protection Agency is responsible for the safe management of hazardous wastes. In May of 1980, this agency released a revised set of guidelines pertaining to hazardous waste materials. The regulations included criteria for the determination of hazardous solid wastes and hazardous waste generators; rules for transporting and disposing of the materials; and a comprehensive listing of hazardous wastes. Any solid waste which exhibits any of the characteristics of hazardous waste (i.e., ignitability, corrosivity, reactivity, and toxicity) is subject to the revised EPA regulations.

These guidelines determined a level of hazardous waste generation for individual generators that is most effectively managed by the agency. Any individual who accumulates, produces, or disposes of a waste classified by the EPA as hazardous at a rate greater than 1,000 kilograms per month (2,200 lbs/month) is subject to the EPA guidelines for hazardous waste management. (This standard does not apply to farmers or ranchers.) Generators of 1,000 kg/month or less of hazardous waste may dispose of the material at an on-site facility or must ensure delivery of the material to an off-site treatment, storage or disposal facility licensed by the State to manage municipal or industrial solid waste. In addition, special regulations apply to individuals or operations which generate more than 10 kilograms per month of wastes categorized by the EPA as "highly toxic".

The Environmental Protection Agency guidelines for hazardous waste management provide the basis for the State of Montana's hazardous waste policies. Wastes classified as hazardous by the State are the same as those classified by the EPA as hazardous. Hazardous waste generators and disposal facilities are required to notify the State regarding the type, quantity and composition of the waste material being handled, and may be required to keep pertinent records regarding the generation, transport and disposal of the hazardous waste. In addition, transporters of hazardous waste materials and hazardous waste disposal facilities must be licensed by the State, and must operate in a manner consistent with state and federal guidelines.

According to State regulations, hazardous wastes must be disposed of at a Class I site. Currently, no Class I sites are located within the State of Montana; however, some on-site disposal of hazardous waste material by industry does occur. The nearest hazardous waste disposal sites are located in Idaho and Oregon. Information regarding hazardous waste disposal at these sites may be obtained by contacting the following firms:

Wes - Con, Inc. (Idaho): (208) 834-2275
Chem Security Systems, Inc. (Oregon): (503) 223-1912

It should be stressed that the Solid Waste Management Bureau of the State Department of Health and Environmental Sciences has the primary responsibility for the safe management of hazardous wastes, and should be contacted prior to the handling and disposal of such materials. Procedures for proper transport, handling and disposal of hazardous wastes can be determined by State officials on a case-by-case basis.

The following narrative identifies the existing and recommended disposal practices for the more commonly generated hazardous waste types within the study area.

a. Pesticides and Pesticide Containers

(1) General

Because of the agricultural nature of a considerable portion of the county, it is expected that significant amounts of excess pesticide and pesticide containers are generated within the study area. Proper handling and disposal techniques must be utilized in order to prevent detrimental effects upon the environment and public health. According to State law, no person shall dispose of or receive for disposal any pesticide container or pesticide residue in a manner inconsistent with its labeling or safe disposal criteria and procedures. It is also unlawful to dispose of these materials by burning or by improper dumping.

(2) Recommended Disposal Procedures

There are several acceptable methods by which excess pesticides may be disposed of without causing adverse effects on the environment. The most preferred method of disposal is to return the excess material to the manufacturer, distributor, or to another party capable of using the material. The alternate disposal method is burial at a state-approved landfill site.

Several procedures are recommended for the safe disposal of pesticide containers. Many combustible containers (fertilizer bags, etc.) may be disposed of at Class I or Class II landfills, depending upon the chemical constituents the container held. Burial of many containers may occur on farm premises in areas which will will not pollute surface or ground waters. Non-combustible containers (metal pesticide tanks, etc.) should be triple-rinsed, following a procedure prescribed by the Department of Agriculture, to dilute the hazardous material prior to disposal. After the rinsing procedure is completed, metal containers may be disposed of by: 1) returning the container to the dealer or distributor; 2) depositing the container at a scrap metal yard or junk vehicle graveyard which has obtained state authorization to recycle pesticide containers; 3) burying the container in a licensed Class I or II landfill; or 4) burying on-farm in an environmentally safe manner.

(3) Waste Pesticide Management Program

The Montana Department of Health and Environmental Sciences was involved in a waste pesticide management program from 1969 through the fall of 1978. The State accepted highly toxic or other waste pesticides from throughout the state and transported them to storage bunkers located at the inactive Glasgow Air Force Base in northeastern Montana. In 1978 the pesticides and pesticide containers were transported to a hazardous waste disposal site near Boise, Idaho. The intent of the program was to provide safe storage and disposal for excess pesticides generated by users who would normally face storage and disposal problems. The funds for the program were exhausted and no grant monies are currently available to continue the program.

b. Used Lubrication Oils

(1) General

Based upon studies performed in other regions of the country, it has been estimated that more than two-thirds of the automobile lubrication oil sold ends up as a waste product which is not salvaged or reclaimed. Waste oils are generally disposed

of in trash collections, on roadways to control dust, or placed directly in landfills. If special precautions are not taken, this oil may eventually find its way into groundwater sources and may become a pollutant to water supplies. According to state law, petroleum wastes are classified as Group I wastes and should be disposed of in a Class I landfill. EPA regulations allow small quantities (1,000 kg/month or less) to be mixed with quantities of household wastes and disposed of at Class II sanitary landfills.

(2) Recommended Disposal Procedures

The most desirable method of reclaiming used oils and other types of waste petroleum products is by means of reprocessing or re-refining. After lubrication oils have been used over a period of time, contaminants such as gasoline, water, heat- and cold-resistant additives and dirt collect in the oil. Re-refining processes may remove the contaminants and the resultant product is a lubricating oil similar to the original product.

Several other methods of reclamation may be used to treat waste oils. These include incineration and use as a fuel source, use as road oil, and use as an asphalt constituent. Tests conducted by various industrial concerns have demonstrated the feasibility of recovering energy from several types of waste lubricants. Waste oil may also be used as a supplemental fuel for large boilers. Although road oils have been and are still manufactured from virgin materials, a large amount of this material is comprised of waste oil. Drain oil and distilled drain oil fractions may be used as cutting stock in the production of asphalt. Most of the metallic compounds present in the oil are relatively insoluble and become coated with asphaltic materials. These qualities make the use of waste oil as an ingredient in the production of asphalt relatively attractive.

Based on the analysis conducted herein, it is apparent that the most desirable method of waste oil reclamation is by re-refining. However, at the present time, no re-refining facilities are available for the waste oils generated by private indivuals in the state. Several industrial concerns within the state operate re-refining facilities; however, these facilities are limited to the use of those oils produced by each operation.

The best current alternative available to most residents is to dispose of waste oils in small quantities at licensed sanitary landfills. In the future, as re-refining facilities become more readily available to residents of the study area, it may become

feasible to set up storage tanks at strategic locations for public use with ultimate disposal at a major waste oil depot. It is likely that larger quantities of waste oil would be readily accepted by re-refiners and would result in a better market price.

PART SIX

RECOMMENDATIONS

PART SIX

RECOMMENDATIONS

A. RECOMMENDED ALTERNATIVES

For the past several months the alternatives that were evaluated in detail for this project have been reviewed by local and state officials and area residents. Several meetings were held with the members of the Refuse District for this purpose. In addition, two public meetings were conducted to obtain local input from the area residents. Based on the input received from the review committee and public meetings, recommendations were formulated by the members of the Refuse District.

The recommended plan for the disposal of the wastes generated in the Seeley Lake Refuse District includes the use of a new Class II sanitary landfill to be located as near as possible to the community of Seeley Lake. The District members have also indicated that if a suitable landfill site cannot be located within a reasonable distance from the community (five miles or less), an alternate recommended plan should be implemented. This alternate plan includes the use of a rolloff container system rather than the use of a new sanitary landfill with the wastes that are generated in the district deposited in a 40-cubic-yard container and ultimately transported to the landfill located in Missoula for disposal.

Included herein is a description of the facilities and the estimated costs for the recommended and alternate recommended waste disposal alternatives for the Seeley Lake Refuse District.

1. Recommended Plan: New Class II Landfill

As previously mentioned, the recommended plan includes the location and subsequent use of a new sanitary landfill to dispose of the wastes generated within the Refuse District. The landfill is to be located and operated in accordance with all State of Montana Class II licensing procedures. The criteria for operating sanitary landfills in Montana are included in Section B of Part Two of this report. Basically, the state criteria that must be met for a Class II landfill include: 1) the site must be located such that no waste is placed within six feet of the high groundwater level or stream; 2) public access to the site should be limited with fences and gates to the number of days deemed necessary to adequately serve the facility users; 3) no open burning shall be permitted at the site at any time; and 4) a minimum of six inches of soil shall be placed on all waste the same day it is deposited.

As indicated in Part Three of this report, it has been determined that the new landfill should be open four days per week during the period extending from mid-May to mid-October, but would only need to be open for two days per week during the remainder of the year to adequately serve the public's needs. Based on input from the Refuse District members, the District's operational plan would include contracting out the daily maintenance of the site (compacting waste and providing soil cover) and the necessary trench excavation. Due to high costs, it was not determined necessary or cost-effective to employ a full-time gate attendant at the site.

The estimated capital and annual costs to locate and operate a Class II landfill for the Seeley Lake Refuse District are summarized in Table VI-1. It should be noted that the capital costs are somewhat hypothetical, since no specific site has been located as of this time. However, it is reasonable to anticipate that the costs included in Table VI-1 are representative of the anticipated costs to locate a new site. It should also be pointed out that the capital costs included herein do not include the expensive construction of an electrified twelve-foot chainlink fence which would be considered bear-proof. If bears were to present problems at a new landfill site, it is anticipated that this type of fencing may be necessary. If this is the case, it is estimated that this type of fence would increase the capital cost requirements by approximately $30,000, which would in turn increase the total annual cost by $4,000 per year if this capital cost were amortized over a 20-year period at 12 percent interest.

During the period between April and June, 1981, investigations were conducted by several individuals including the County Extension Agent, County Sanitarian, the Consultant and local interested residents to locate a new landfill site. The investigations that were conducted are summarized in Appendix A. Basically, at this time no landfill site has been obtained primarily due to high groundwater and poor hydrogeologic conditions in the area, coupled with the fact that landowners in the area are reluctant to grant, lease or sell parcels of land for a landfill site.

2. Alternate Recommended Plan (Roll-Off Container System)

This alternate plan includes the location of a roll-off container site near Seeley Lake with the wastes deposited in the containers ultimately transported to a sanitary landfill located in Missoula. The container site would include a concrete retaining wall, an earth-filled ramp, a shelter over the dumping area, and a 40-cubic-yard metal container. A graphic illustration of this typical container site is depicted in Figure III-3. For this alternative, it is recommended that the container site be located as close as possible to Seeley Lake. It is anticipated that the site would encompass approximately one acre of land.

TABLE VI-1

RECOMMENDED PLAN

CAPITAL AND ANNUAL COSTS
(NEW CLASS II SANITARY LANDFILL)

CAPITAL COSTS

Item	Units	Unit Cost	Total Cost
1. Land	8 ac.	$3,000/ac.	$24,000
2. Sitework	L.S.	—	4,000
3. Fencing	1,600 ft.	$2.50/ft.	4,000
4. Roads	1,000 ft.	$15.00/ft.	15,000
5. Building	1,000 sq.ft.	$15.00/sq.ft.	15,000
6. Utilities	L.S.	—	500
7. Contingency	L.S.	15%	9,500
Total Capital Cost:			$72,000

ANNUAL COST
(148 days/year)

Item	Units	Unit Cost	Total Cost
1. Site & Road Maintenance	L.S.	—	$ 500
2. Utilities & Insurance	L.S.	—	900
3. Dozer Operation & Labor (Contract)	296 hrs.[1]	$55.00/hr.	16,280
4. Trench Excavation (Contract)	3,700 cu.yd.	$2.00/cu.yd.	7,400
Subtotal:			$25,080
Amortization of Capital (12% - 20 yrs.)			9,650
Total Annual Cost:			$34,730
Annual Cost/Equivalent Residential Unit[2]			$35.76

[1] Based on two hours per day for each day the site is open

[2] Based on 971 equivalent units

In regard to the operation of the system, it is anticipated that access to the container site would not be limited. All types of waste including conventional, residential and commercial wastes, appliances and large objects, and a limited amount of rubble and demolition debris would be accepted. Once each 40-cubic-yard container was filled a specially designed tilt-frame vehicle would be utilized to drop an empty container at the site and to pick up the full container. According to current waste generation data, it is estimated that approximately 243 loads would be transported annually by the tiltframe vehicle to Missoula in order to dispose of the wastes generated within the study area.

The estimated capital and annual costs to operate this disposal system are summarized in Table VI-2. Like the landfill alternative previously mentioned, the capital costs included herein are estimates due to the fact that a specific site has not been identified. It should also be pointed out that the costs contained in the table assume that the District would own and maintain the container site but that the ownership and operation of the tilt-frame vehicle and the necessary containers would be contracted out to a private enterprise.

B. IMPLEMENTATION STRATEGIES

1. Organizational Strategies

After reviewing several alternate implementation strategies, it is recommended that the existing Seeley Lake Refuse District continue to be the legal entity which will implement the recommendations of this study. The Board of Directors and financial framework have been organized and in operation for the past few years, and thus this District has the experience and organizational expertise to carry out the necessary steps to implement the program.

2. Financial Strategies

There are two alternative means of financing the projected costs for the recommended waste management plan(s). The first alternative would involve the implementation of a service charge to be assessed to each District member along with the general county taxes. The assessment should be equitable and based on the quantities of waste generated. Once the program has been put into effect, a detailed survey may be necessary to determine each individual commercial and residential unit's equitable assessment. Average equivalent unit assessments have been estimated for the recommended

TABLE VI-2

ALTERNATE RECOMMENDED PLAN

CAPITAL AND ANNUAL COSTS
(ROLL-OFF CONTAINER SYSTEM)

CAPITAL COSTS

Item	Total Cost
1. Land	$3,000
2. Sitework and Ramp	3,000
3. Concrete Slab and Wall	7,000
4. Shelter	3,000
5. Container	5,000
6. Contingency	2,000
Total:	$23,000

ANNUAL COSTS

Item	Units	Unit Cost	Total Cost
1. Maintenance of Container Site	L.S.	—	$ 200
2. Tilt-Frame Vehicle:			
a) Depreciation, Operation, & Maintenance	26,730 mi.	$1.13/mi.	30,200
b) Labor	972 hrs.	$10/hr.	9,720
3. Drop Charge at Missoula Landfill	883 tons	$5.50/ton	4,860
Subtotal:			$44,780
Amortization of Capital (12% - 20 yrs.)			3,080
Total Annual Cost:			$48,060
Annual Cost/Equivalent Unit per Year[1]			$49.50

[1] Based on 971 equivalent units

alternative and were utilized to determine the estimated equivalent residential unit cost. In regard to financing initial capital outlays required by the district, it is recommended that either direct loans or possible state or federal grants be utilized. For all costs included herein, it has been assumed that direct loans with terms equal to twelve percent annual interest for a 20-year payback period would be utilized.

A second alternate strategy to finance the necessary system costs would involve an increase in the mill levy assessment to all Refuse District members in order to raise the capital investment requirements. Under this assessment method, the necessary financing of the annual operational costs could then be financed either through a service charge assessment to each Refuse District member or through a user charge system whereby a gate attendant working at the refuse disposal facility would collect fees according to a pre-determined rate schedule. If this user charge system is utilized, however, the annual cost to operate the recommended plan(s) will probably be somewhat higher than shown in Tables VI-1 and VI-2 since the cost of a gate attendant was not included in these estimates.

Through discussing the various available financial strategies with county and city officials who have implemented waste programs similar to those recommended herein, it is the general consensus of most officials that the service charge assessment is by far the best financial strategy for these types of programs for the following reasons: 1) it is the most equitable method since it is based on volumes of waste generated rather than on taxable valuation; 2) it is considerably easier and less expensive to assess than user charge systems; and 3) more waste is disposed of at the program's facilities and less waste is indiscriminately dumped in ravines, etc. due to the fact that gate fees tend to discourage the use of public facilities. Obviously, the final decision on which financial strategy is most appropriate for this project will depend on the final alternative selected and the operational strategy implemented.

3. Implementation Schedule

To effectively and efficiently implement the recommended plan for the district, it is necessary to delineate and follow a detailed schedule. Included in Table VI-3 is a general implementation and time schedule that may be appropriate. As indicated in the enclosed time schedule, the first major decision that must be made by the District involves the selection of the disposal alternative which should be implemented. As

indicated herein, the primary recommendation includes the use of a new sanitary landfill located in the Seeley Lake area with the alternate plan involving the use of a 40-cubic-yard transfer system. Once this decision has been made by the Refuse Board members, the remaining tasks necessary to implement the selected disposal system should be similar, regardless of which disposal alternative is implemented.

TABLE VI-3

SEELEY LAKE REFUSE DISTRICT
IMPLEMENTATION SCHEDULE

TASK	ESTIMATED TIME FRAME
1. Finalize Site Location Evaluations and Select Disposal Alternative to be Implemented.	01/01/82 - 06/01/82
2. Finalize Implementation Strategies.	06/01/82 - 07/01/82
3. Prepare Plans and Specifications for Constructing Necessary Site Improvements.	07/01/82 - 09/01/82
4. Prepare Specifications for Obtaining Competitive Bids for the Operation of the Proposed Facilities and Equipment.	07/01/82 - 09/01/82
5. Obtain Necessary Licenses and Permits.	09/01/82 - 11/01/82
6. Advertise and Award Contract(s) for Constructing Necessary Site Improvements.	11/01/82 - 02/01/83
7. Advertise and Award Contract(s) for the Operation of the Proposed Facilities and Equipment.	11/01/82 - 02/01/83
8. Complete the Construction of all Necessary Site Improvements.	02/01/83 - 07/01/83
9. Determine Final User Assessment.	04/01/83 - 06/01/83
10. Begin Use of New System.	07/01/83

APPENDIX A

SANITARY LANDFILL SITE LOCATION INVESTIGATIONS

APPENDIX A

SANITARY LANDFILL
SITE LOCATION INVESTIGATIONS

A. INTRODUCTION

As a result of the economic cost comparisons of the various alternatives evaluated for the Seeley Lake Refuse District in Part Three of this report, it was the general consensus of the Refuse District Board of Directors to implement the alternative of locating a new district landfill as close as possible to Seeley Lake. Based on this decision, the final efforts of this study were directed toward conducting a landfill location study for the area.

Initially, the Board of Directors, the County Sanitarian and the Consultant obtained available ownership, topographic and soils maps of the Seeley Lake area. From these maps, eight possible landfill sites were identified for further analysis. Through on-site visits and consultations with Mr. Skip Stem (Soil Scientist for the Soil Conservation Service) and representatives of the State of Montana Solid Waste Management Bureau, the sites were evaluated and ranked according to various applicable criteria. Included in the following narrative, tables and figure is a summary of this location analysis.

B. GENERAL DESCRIPTION OF SITE LOCATION CRITERIA EVALUATED

Summarized herein is a general description of the major criteria that were evaluated for the eight possible landfill sites.

1. Capacity

The volume requirements for a landfill site are directly related to the quantities of solid waste generated, the in-place density of the solid waste, and the hydrogeologic conditions. A landfill site should be of adequate size to dispose of the planning area's wastes for a minimum of 20 years.

2. Land Availability and Surrounding Land Use

An important criterion that must be considered when locating a landfill site is the compatibility of the landfill operation with the land use of the adjacent properties. In essence, the operation of a landfill is similar to a large excavation project. Basically, the operation of a landfill

consists of excavating large volumes of soil and then replacing the soil on deposited wastes at some future time.

Due to the nature of a sanitary landfill operation, it is most desirable to locate a landfill adjacent to property utilized for industrial or agricultural purposes. If a landfill is operated extremely well, however, landfills can also be located near residential areas. Regardless of the surrounding land use, however, extreme precautions should be taken to minimize the excessive noise, traffic, and blowing paper and debris which may result from the day-to-day operation of a sanitary landfill.

In addition to the surrounding land use of an area, the availability of land is a key factor when locating a landfill site. The most desirable situation is to locate parcels of land which the landowners are willing to sell or lease for a fair market price and/or parcels of land which are publicly owned. In most instances, if owners are not initially willing to sell land for a landfill site, condemnation proceedings will be required. This acquisition procedure is usually not only time-consuming, but also quite expensive.

3. Topography

A sanitary landfill can be constructed on virtually any terrain, but some land forms require that extensive site improvements be made and expensive operational techniques followed. Flat or gently rolling land not subject to flooding is best, but this type is also highly desirable for farming and industrial parks, and this desirability drives up the purchase price.

Depressions such as canyons and ravines are more efficient than flat areas from a land use standpoint since they can hold more solid waste per acre. Cover material may, however, have to be hauled in from surrounding areas. Depressions usually result when surface waters run off and erode the soil and rock. By their nature, these types of terrain require special measures to keep surface waters from inundating the fill.

There are also numerous man-made topographic features scattered over the land such as stone and clay quarries, sand and gravel pits. In most cases, these abandoned depressions are useless, dangerous eyesores. Many of them can be safely and economically reclaimed by utilizing them as sanitary landfills.

4. Hydrogeologic Conditions

When analyzing a potential sanitary landfill site, two main hydrogeologic conditions should be reviewed: 1) the location of groundwater; and 2) the classification of soils and geologic

conditions. The major hydrogeologic criteria which should be analyzed for each condition when locating a landfill site are summarized herein.

(a) Groundwater

Currently, the state laws and regulations require that solid wastes cannot be placed in the zone of saturation. This is due to the potential groundwater pollution which may occur when decomposed solid waste interacts with water to produce "leachate" (a solution containing dissolved and finely suspended solid matter and microbial waste products). To protect against the possibility of the leachate generated at a landfill reaching the groundwater, an impermeable layer of soil is usually recommended.

Because of the potential for polluting the groundwater at a landfill site, detailed investigations should be conducted to determine the exact location of the groundwater. The site should then be designed so that the waste does not come into contact with the groundwater. The depth to which solid waste can be placed in a site and consequently the site's life will be limited by the location of the groundwater.

(b) Geologic Conditions

Three geologic considerations should be analyzed when a potential sanitary landfill site is evaluated: 1) the suitability of existing soils for the excavation of trenches; 2) the suitability of utilizing excavated material for covering solid wastes; and 3) the suitability of existing soils to retain leachate within the confines of the landfill site.

Basically, the most suitable geologic conditions for a landfill site consist of a 20- to 40-foot sandy loam layer of soil underlain by an impermeable clay layer. The sandy loam soils are quite favorable due to the ease in which the material can be excavated and utilized for providing daily soil cover on the deposited solid wastes. Naturally, the denser the soils are, the less favorable the site is due to higher excavation and daily cover costs. The least desirable soil types for a landfill site are bedrock and shales.

In regard to the base of a sanitary landfill, a highly impermeable layer of material is most desirable. A silty clay or clay material is most suitable, although other material types are adequate if the site is properly designed and the materials are compcted to their optimum moisture content.

5. Access

Because of the high number of vehicles which utilize a landfill over its useful life, the transportation distances and access to a site are quite important. The site should be located as

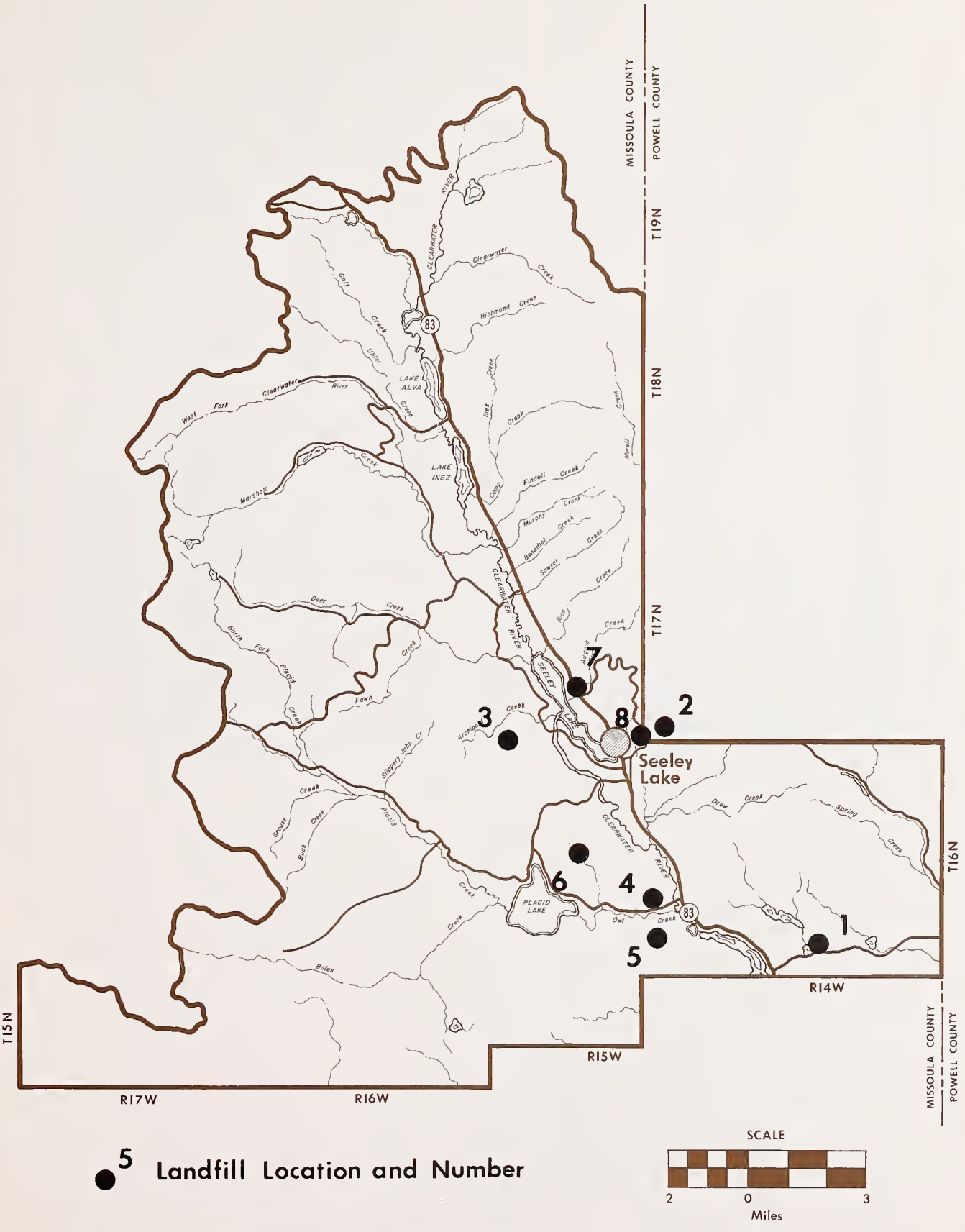
close to the centroid of waste generation as possible, and should also be located on or near the major highways and arterials serving the landfill's service area. In most instances, it is not recommended to route solid waste collection vehicles through residential areas. If a sanitary landfill must be located near a residential area, alternate transportation systems should be developed if at all possible.

In addition to the permanent roads provided by the public road service, it is also necessary to provide a system of permanent and temporary on-site roads. On-site roads may be constructed by compacting the natural soil present and by controlling drainage or by topping with a layer of tractive material such as gravel, crushed stone or cinders. If more than 100 to 150 vehicles per day utilize the site, it may prove advantageous to utilize lime, cement or asphalt binders to make the road more serviceable.

C. SUMMARY OF LANDFILL LOCATION INVESTIGATIONS

As previously mentioned, eight alternate landfill sites were identified and evaluated according to the location criteria discussed in Section B above. The approximate locations of these sites are shown on Figure A-1. A brief description of each of the eight sites is included in Table A-1.

Based on the investigations and analyses conducted for each of the eight sites, it was attempted to rate each site according to the criteria summarized herein. This ranking is given in Table A-2. As shown in this table, Site No. 4, which is owned by Champion Intenational, and Sites No. 7 and 8, which are located on U.S. Forest Service land, appear to have the highest overall ratings based on the criteria analyzed. It should be noted however, that due to the porous soil types and the high groundwater in the Seeley Lake area, it does not appear that any of the eight sites investigated would meet state and federal hydrogeologic criteria without utilizing some type of plastic or bentonite liner to reduce the percolation rate of the landfill base to minimum acceptable levels. As of this date, the local officials in the area have not made a final decision as to the location of a landfill site.



Robert Peccia & Associates

Helena — Havre

Potential Landfill Sites

SEELEY LAKE REFUSE DISTRICT
SOLID WASTE MANAGEMENT PLAN

Figure A-1

TABLE A-1

SEELEY LAKE SOLID WASTE STUDY

POTENTIAL LANDFILL SITE DESCRIPTIONS

SITE NUMBER	SITE LOCATION	SITE OWNERSHIP	GENERAL SOILS INFORMATION	GENERAL COMMENTS
1.	8 miles southeast of Seeley Lake (Sec. 33, R14W, T16N)	Private	Deep, well-drained loamy till and alluvium in glaciated valleys; 10-20% elay; no bedrock or groundwater problems; some stony land; poorly drained depressions; low shrink/swell potential; moderate to rapid permeability	Site located in large ravine; aceess needs improvement
2.	3 miles northeast of Seeley Lake (Sec. 36, R15W, T17N)	State of Montana	Deep, well-drained loamy alluvium on fans and terraces; 10 - 20% elay; no bedroek or groundwater problems; stony areas and poorly drained depressions exist; low shrink/swell potential; rapid permeability	Located at end of airport runway; possible problems with FAA
3.	5 miles west of Seeley Lake (Sec. 32, R15W, T17N)	National Forest Service	Deep, well-drained loamy till in glaciated valleys and foothills; 10-35% elay; no bedroek or groundwater problems; contains poorly drained depressions; low to moderate shrink/swell potential; moderate to moderately slow permeability	Loeated in large clearing; very poor aeeess due to unimproved existing road
4.	5½ miles south of Seeley Lake (Sec. 23, R15W, T16N)	Champion International	Deep, well-drained loamy till in glaciated valleys; 10-20% elay; no bedroek or groundwater problems; some poorly drained areas; low shrink/swell potential; moderate permeability	Located in ravine; a one-half mile aceess road would have to be built
5.	5½ miles south of Seeley Lake (Sec. 26, R15W, T16N)	State of Montana	Deep, well-drained loamy till in mountain valleys; 3-10% clay; no bedrock or groundwater problems; very low shrink/swell potential; moderate permeability	Located near Clearwater River; access would be diffieult in winter
6.	3 miles south of Seeley Lake (Sec. 16, R15W, T16N)	State of Montana	Deep, well-drained loamy till in glaciated valleys; 10-20% clay; elay; no bedrock or groundwater problems; some poorly drained areas; low shrink/swell potential; moderate permeability	Loeated in a drainage area; access would be diffieult in winter
7.	1½ miles north of Seeley Lake (Sec. 27, R15W, T17N)	National Forest Service	Deep, well-drained loamy glacial till in valleys and foothills; 10-35% clay; no bedrock or groundwater problems; some poorly drained depressions exist; low to moderate shrink/swell potential; moderate to moderately slow permeability	Loeated at old gravel pit near highway; site would have to be expanded to handle refuse disposal needs after first five years
8.	1½ miles northeast of Seeley Lake (Sec. 35, R15W, T17N)	National Forest Service	Deep, well-drained loamy till in mountain valleys; 3-10% elay; no bedrock or groundwater problems; very low shrink/swell potential; moderate permeability	Old dump site; access is quite good

TABLE A-2

SEELEY LAKE SOLID WASTE STUDY

POTENTIAL LANDFILL SITES RANKING

Site No.	General Topography & Land Use	Hydrogeologic Conditions	Access	Haul Cost	Site Development Cost	Overall Site Suitability
1	Good	Poor	Fair	Poor	Fair	Fair - Poor
2	Poor	Poor	Fair	Fair	Fair	Fair - Poor
3	Good	Fair	Poor	Poor	Poor	Fair - Poor
4	Good	Fair	Good	Fair	Fair	Good - Fair
5	Fair	Fair	Fair	Fair	Poor	Fair
6	Poor	Fair	Poor	Fair	Poor	Fair - Poor
7	Fair	Fair	Excellent	Good	Fair	Good - Fair
8	Fair	Fair	Good	Good	Fair	Good - Fair